

## **Appendix RF Test Data for 2.4G WIFI**

**Company:** : GREEN HYDRO ENVIRONMENTAL TECHNOLOGY(NINGBO) CO.,LTD

**EUT** : CONTROLLER

**FCC ID:** : 2BX5B-MINI

**Model Number** : Mini

**Report No.** : HTT202608964F01

**Reviewed By** : Heber He

## 1. Duty Cycle

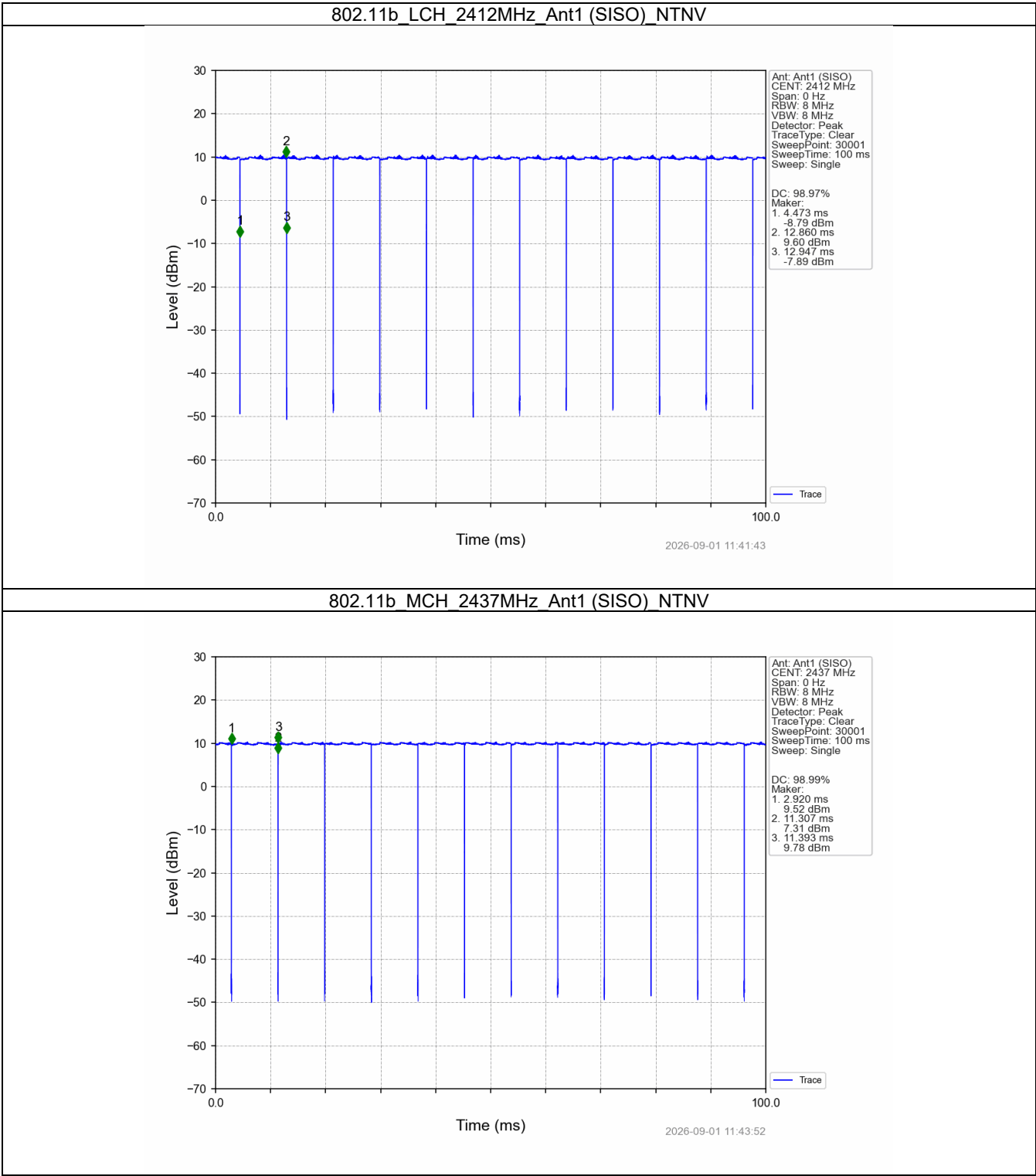
### 1.1 Test Result

#### 1.1.1 Ant1

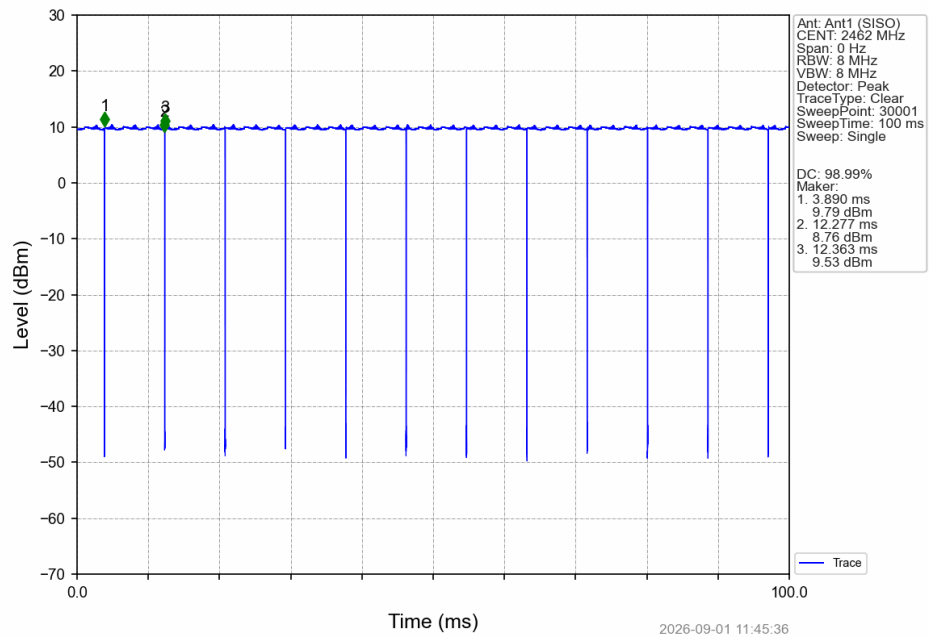
| Ant1           |         |                 |           |             |                |                                   |                       |
|----------------|---------|-----------------|-----------|-------------|----------------|-----------------------------------|-----------------------|
| Mode           | TX Type | Frequency (MHz) | T_on (ms) | Period (ms) | Duty Cycle (%) | Duty Cycle Correction Factor (dB) | Max. DC Variation (%) |
| 802.11b        | SISO    | 2412            | 8.387     | 8.474       | 98.97          | 0.04                              | 0.00                  |
|                |         | 2437            | 8.387     | 8.473       | 98.99          | 0.04                              | 0.04                  |
|                |         | 2462            | 8.387     | 8.473       | 98.99          | 0.04                              | 0.04                  |
| 802.11g        | SISO    | 2412            | 5.486     | 5.544       | 98.95          | 0.05                              | 0.04                  |
|                |         | 2437            | 5.486     | 5.544       | 98.95          | 0.05                              | 0.03                  |
|                |         | 2462            | 5.486     | 5.544       | 98.95          | 0.05                              | 0.04                  |
| 802.11n (HT20) | SISO    | 2412            | 0.166     | 0.170       | 97.65          | 0.10                              | 0.08                  |
|                |         | 2437            | 0.166     | 0.169       | 98.22          | 0.08                              | 0.04                  |
|                |         | 2462            | 0.166     | 0.169       | 98.22          | 0.08                              | 0.04                  |

1.2 Test Graph

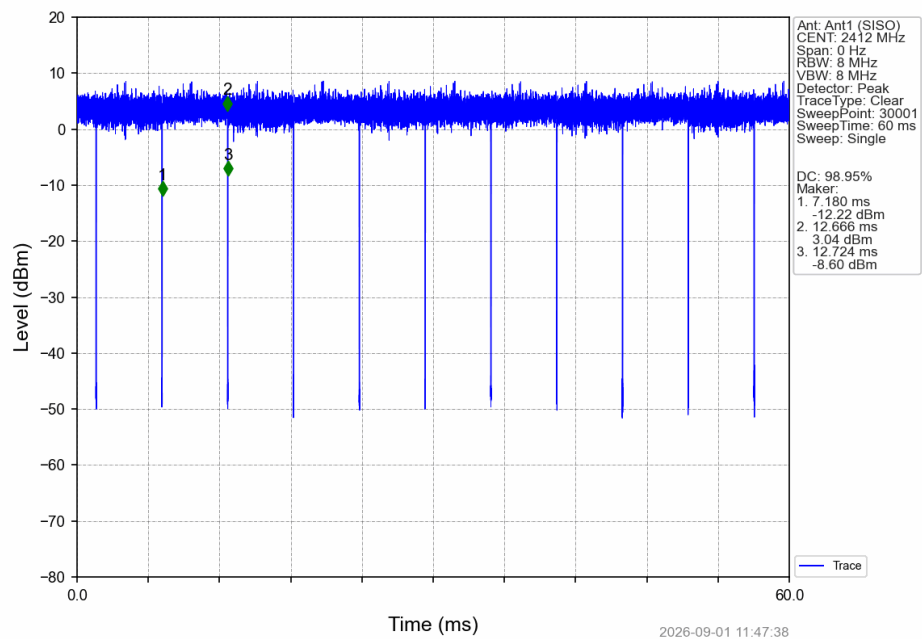
1.2.1 Ant1



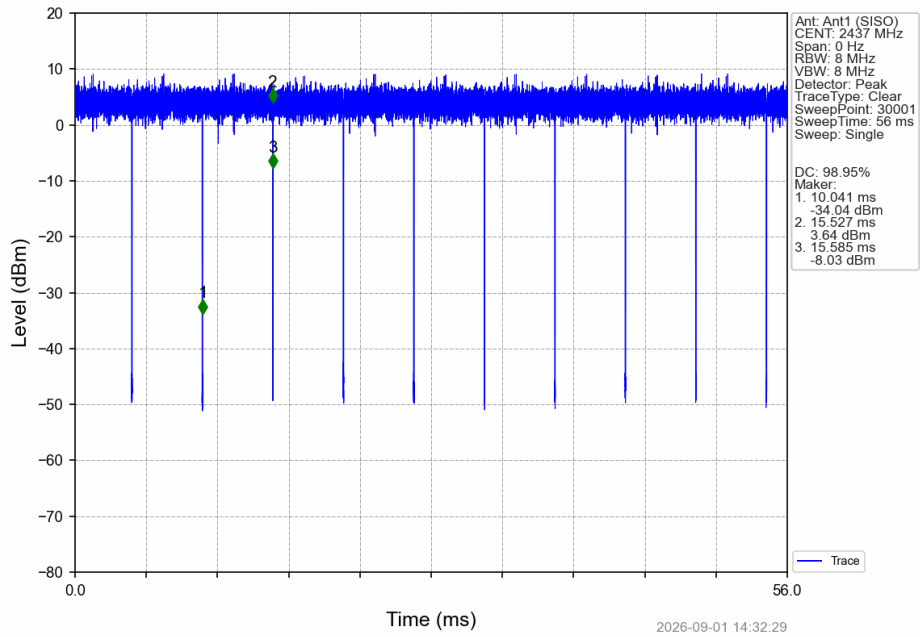
# 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



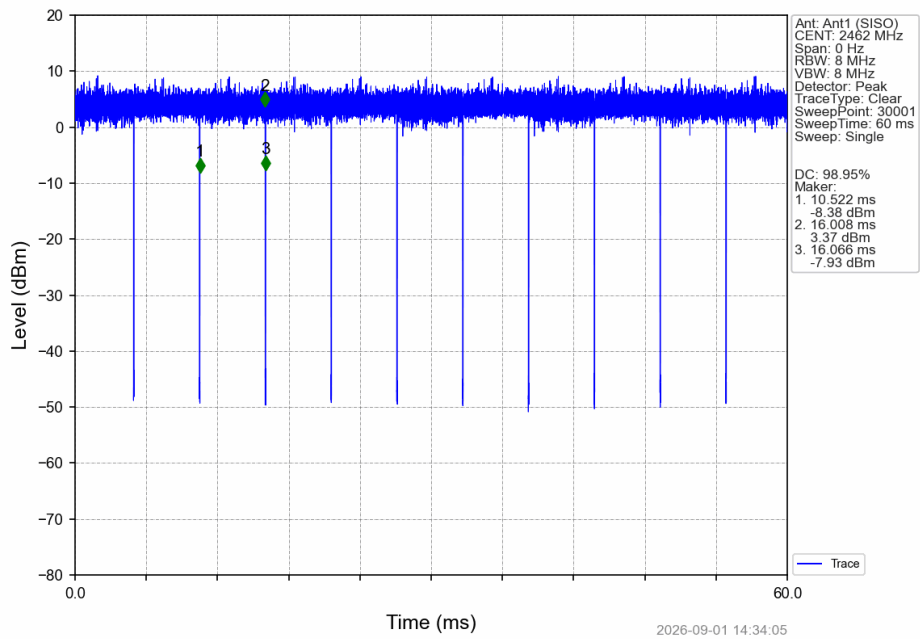
# 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



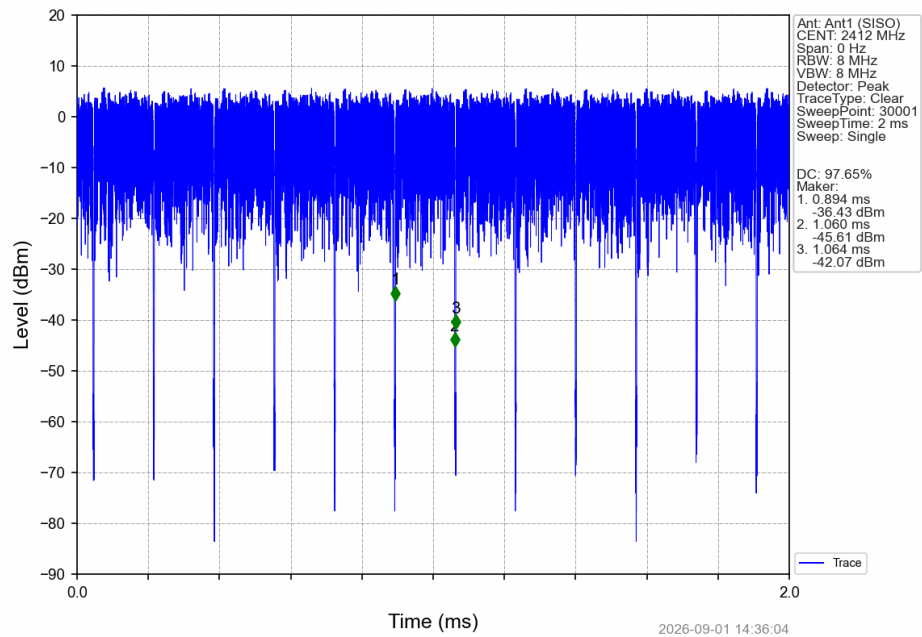
### 802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



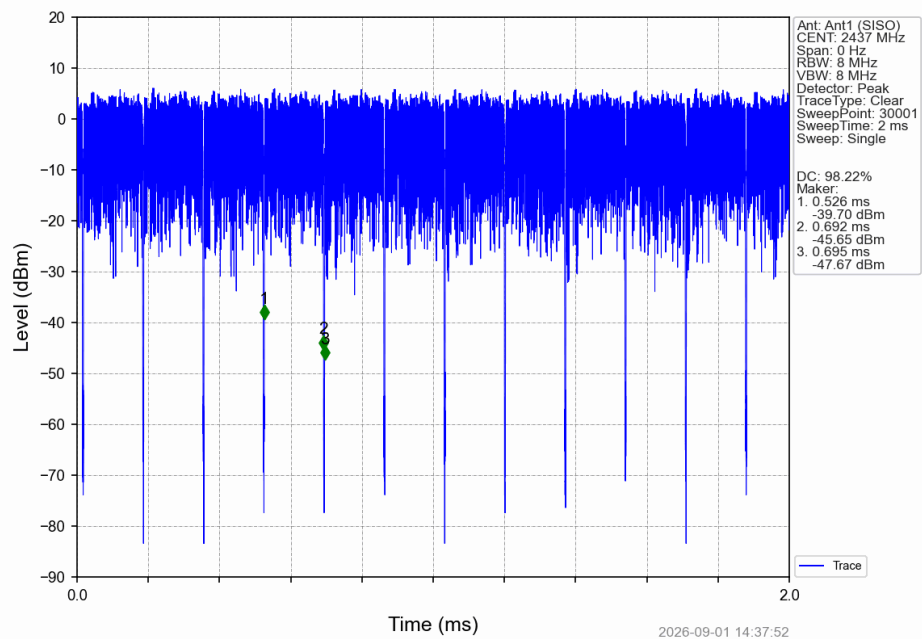
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



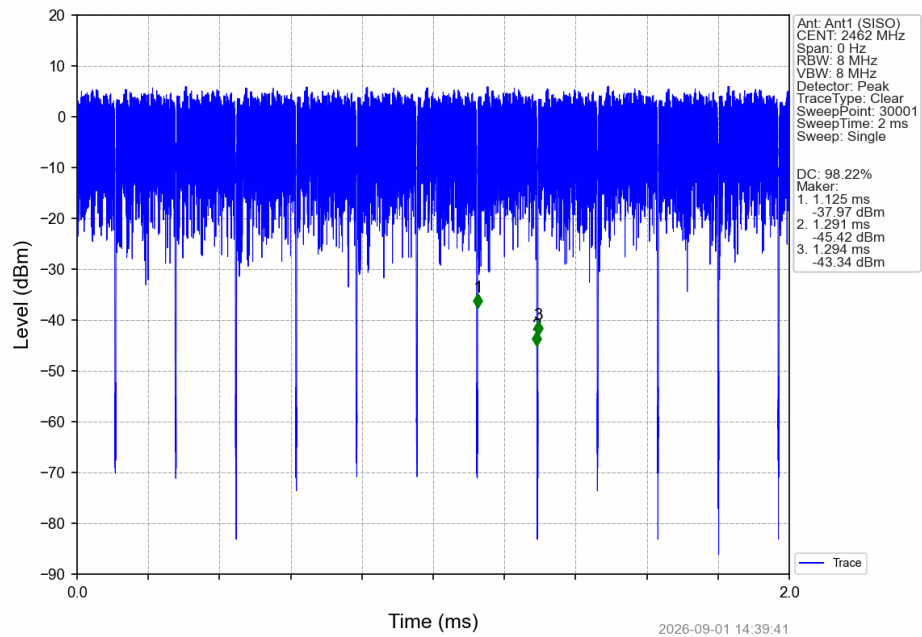
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



# 802.11n(HT20)\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



## 2. Bandwidth

### 2.1 Test Result

#### 2.1.1 OBW

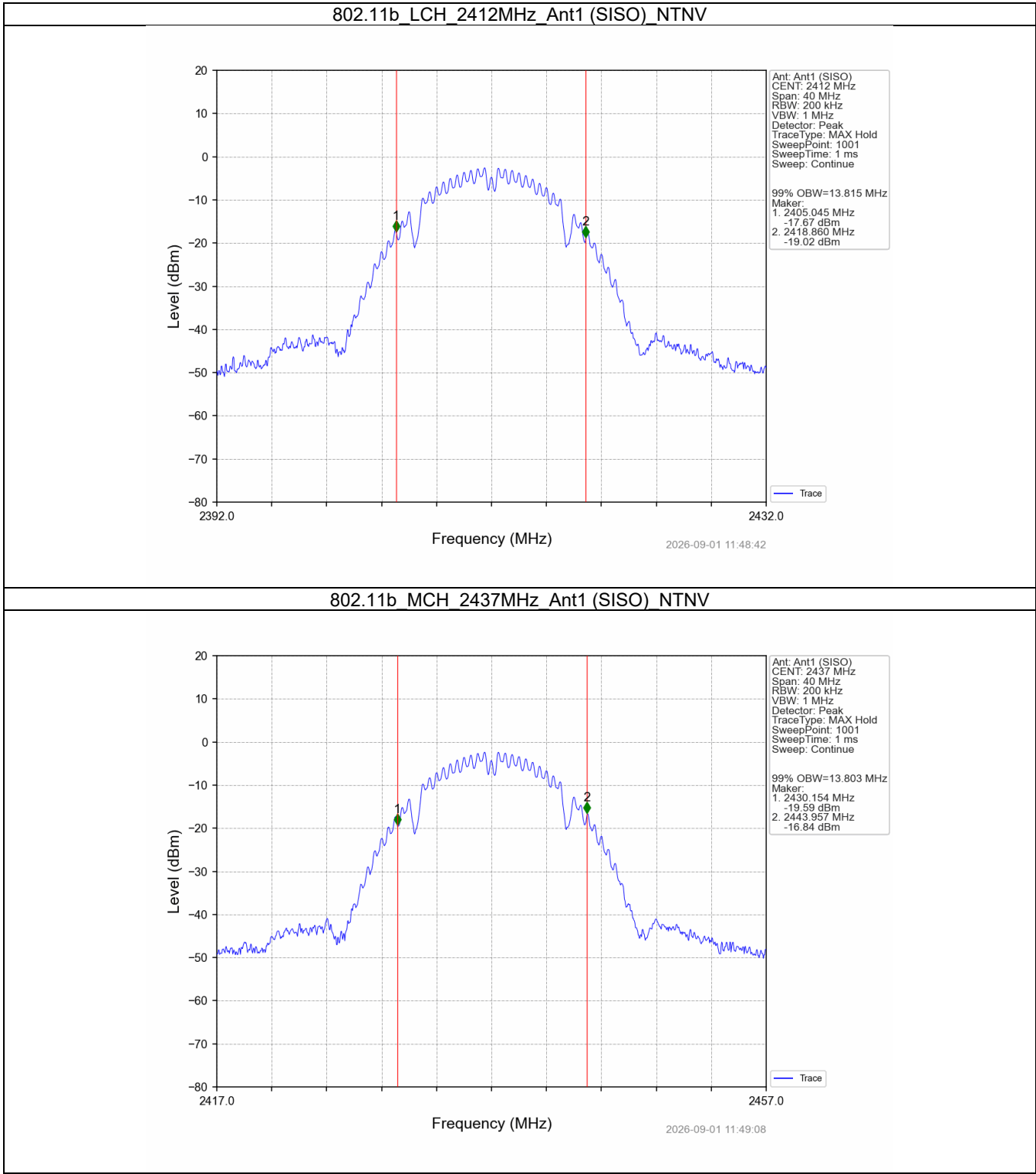
| Mode           | TX Type | Frequency (MHz) | ANT | 99% Occupied Bandwidth (MHz) |       | Verdict |
|----------------|---------|-----------------|-----|------------------------------|-------|---------|
|                |         |                 |     | Result                       | Limit |         |
| 802.11b        | SISO    | 2412            | 1   | 13.815                       | /     | Pass    |
|                |         | 2437            | 1   | 13.803                       | /     | Pass    |
|                |         | 2462            | 1   | 13.901                       | /     | Pass    |
| 802.11g        | SISO    | 2412            | 1   | 17.421                       | /     | Pass    |
|                |         | 2437            | 1   | 17.453                       | /     | Pass    |
|                |         | 2462            | 1   | 17.520                       | /     | Pass    |
| 802.11n (HT20) | SISO    | 2412            | 1   | 17.883                       | /     | Pass    |
|                |         | 2437            | 1   | 17.863                       | /     | Pass    |
|                |         | 2462            | 1   | 17.904                       | /     | Pass    |

#### 2.1.2 6dB BW

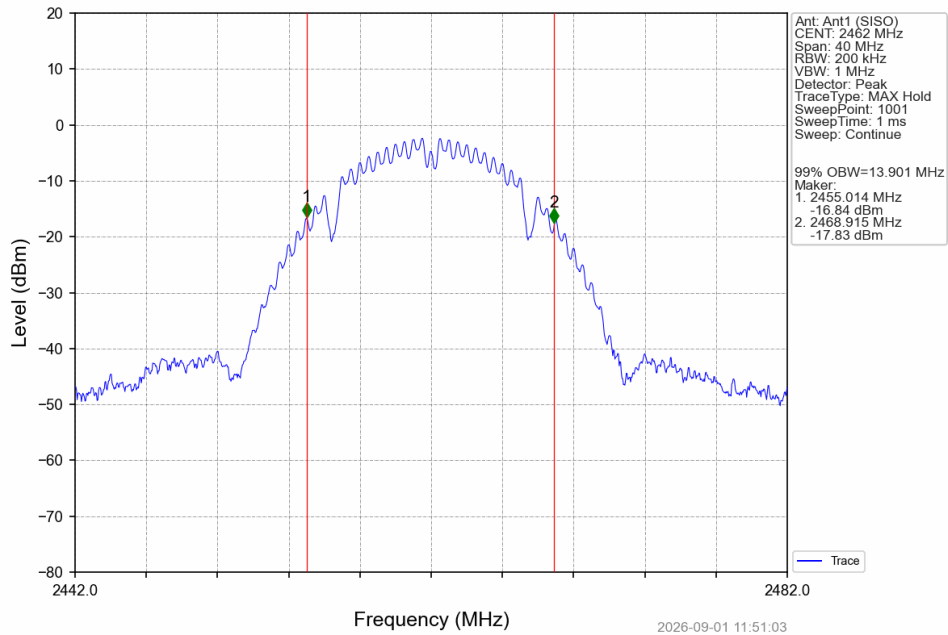
| Mode           | TX Type | Frequency (MHz) | ANT | 6dB Bandwidth (MHz) |            | Verdict |
|----------------|---------|-----------------|-----|---------------------|------------|---------|
|                |         |                 |     | Result              | Limit      |         |
| 802.11b        | SISO    | 2412            | 1   | 9.113               | $\geq 0.5$ | Pass    |
|                |         | 2437            | 1   | 9.103               | $\geq 0.5$ | Pass    |
|                |         | 2462            | 1   | 9.134               | $\geq 0.5$ | Pass    |
| 802.11g        | SISO    | 2412            | 1   | 12.110              | $\geq 0.5$ | Pass    |
|                |         | 2437            | 1   | 9.186               | $\geq 0.5$ | Pass    |
|                |         | 2462            | 1   | 13.199              | $\geq 0.5$ | Pass    |
| 802.11n (HT20) | SISO    | 2412            | 1   | 13.829              | $\geq 0.5$ | Pass    |
|                |         | 2437            | 1   | 13.394              | $\geq 0.5$ | Pass    |
|                |         | 2462            | 1   | 15.091              | $\geq 0.5$ | Pass    |

2.2 Test Graph

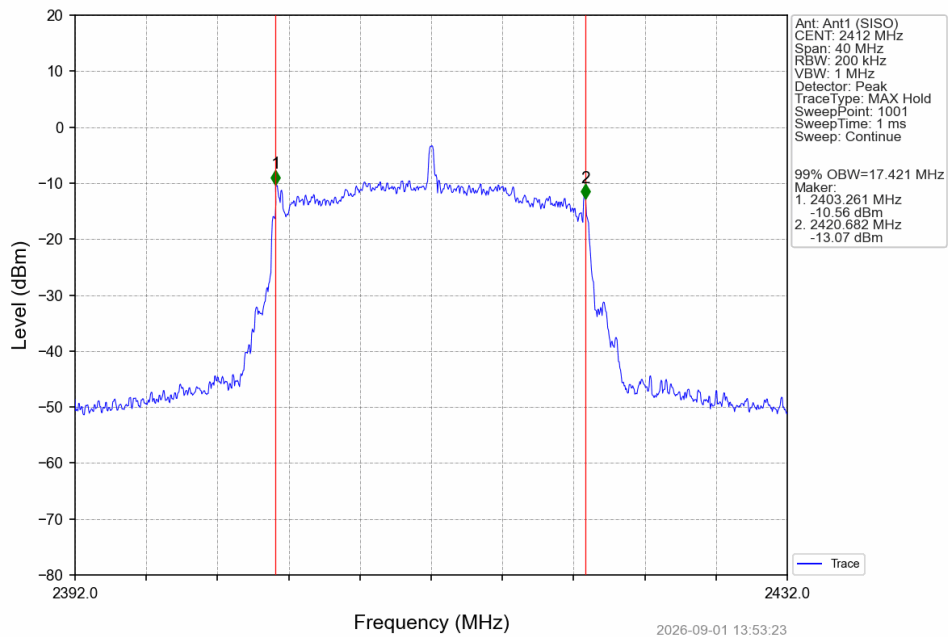
2.2.1 OBW



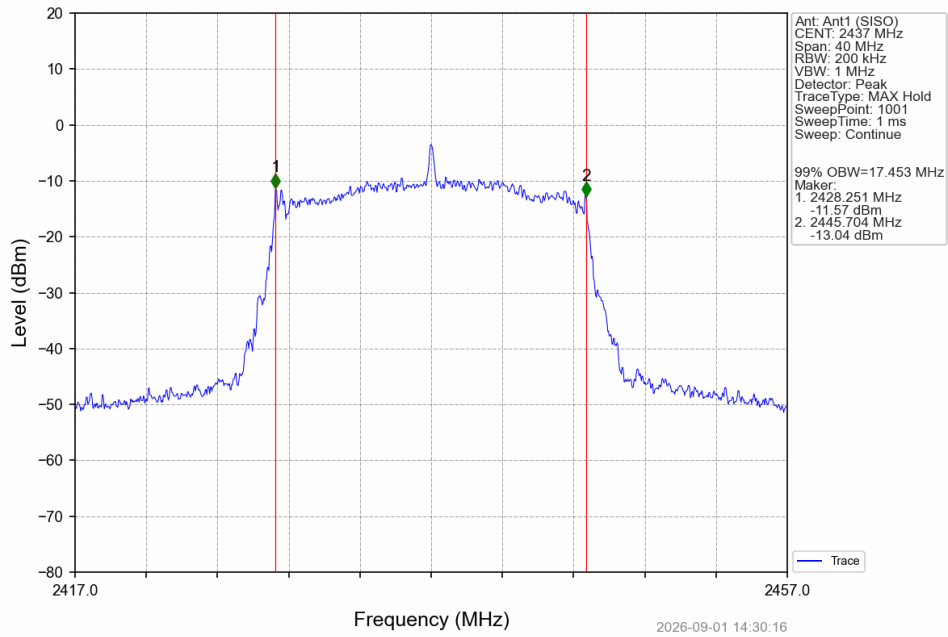
### 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



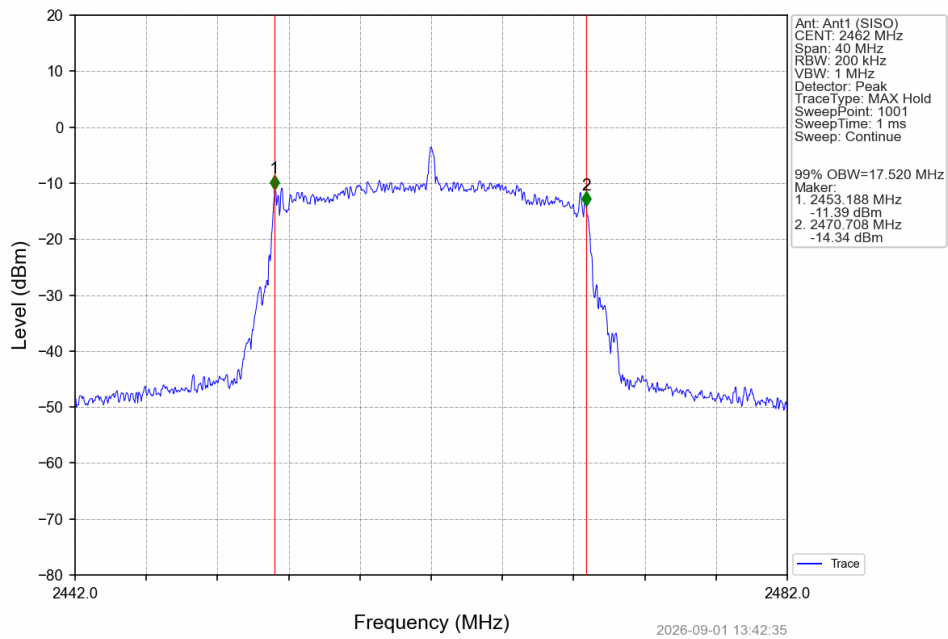
### 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



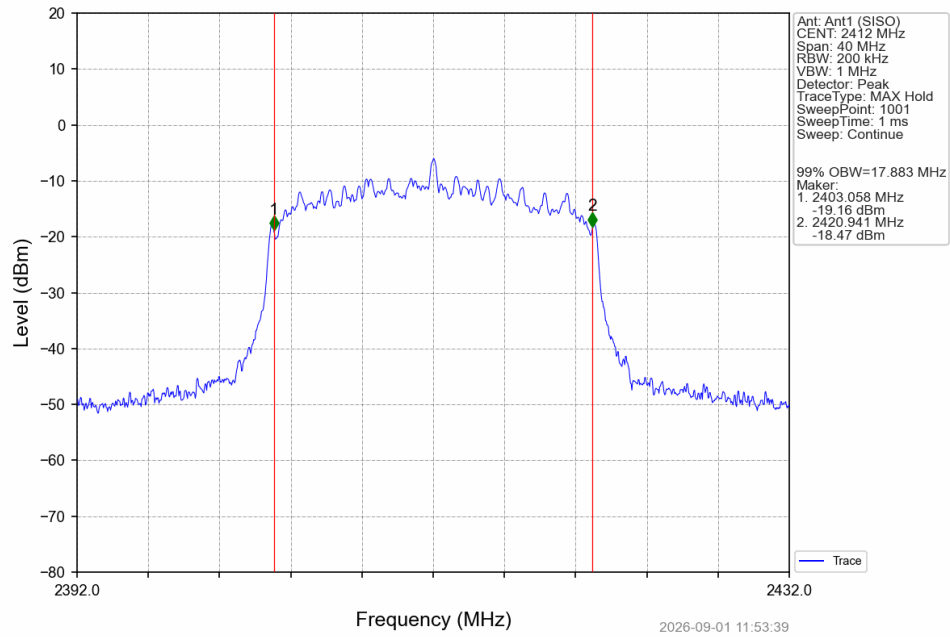
### 802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



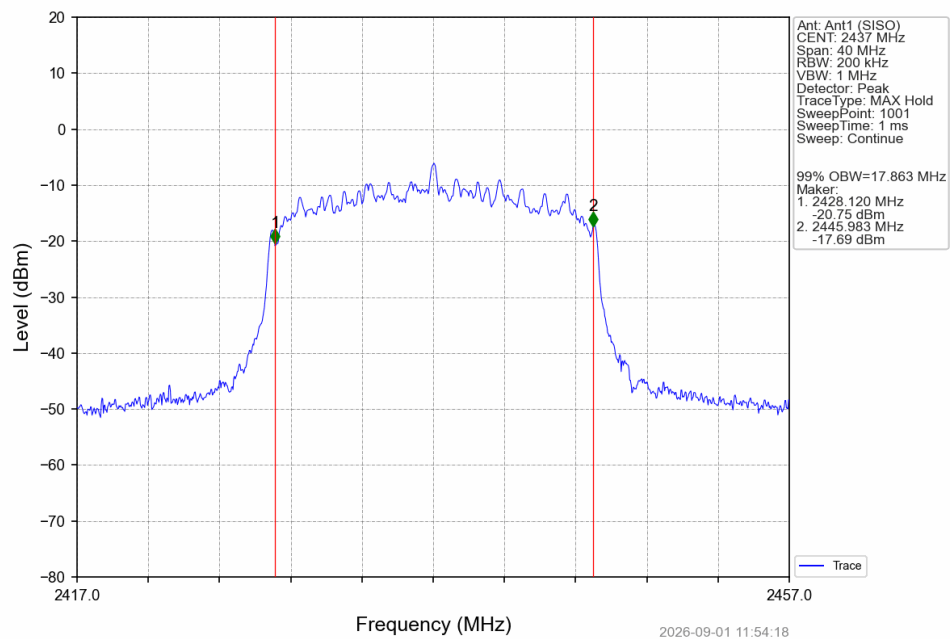
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



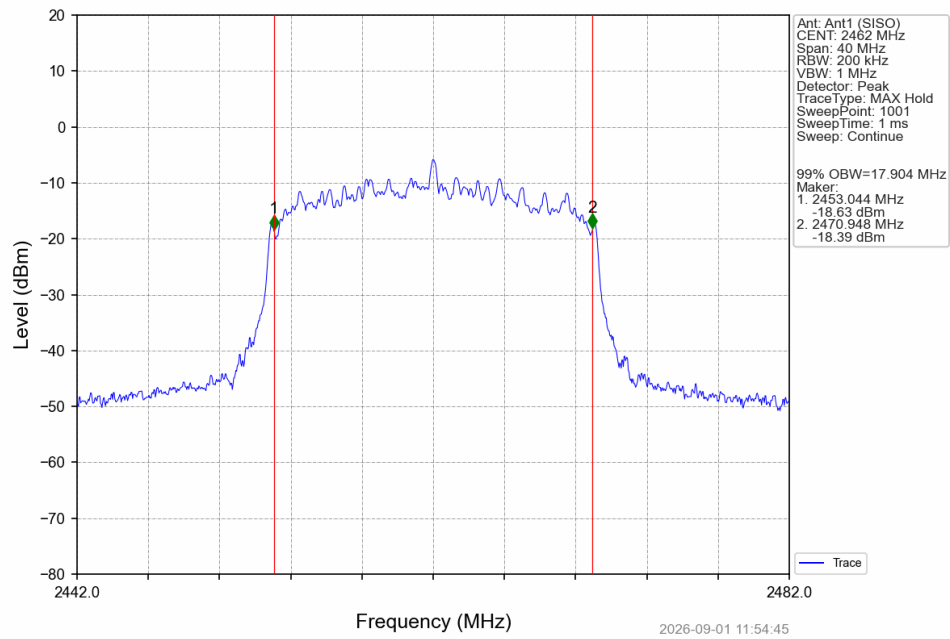
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



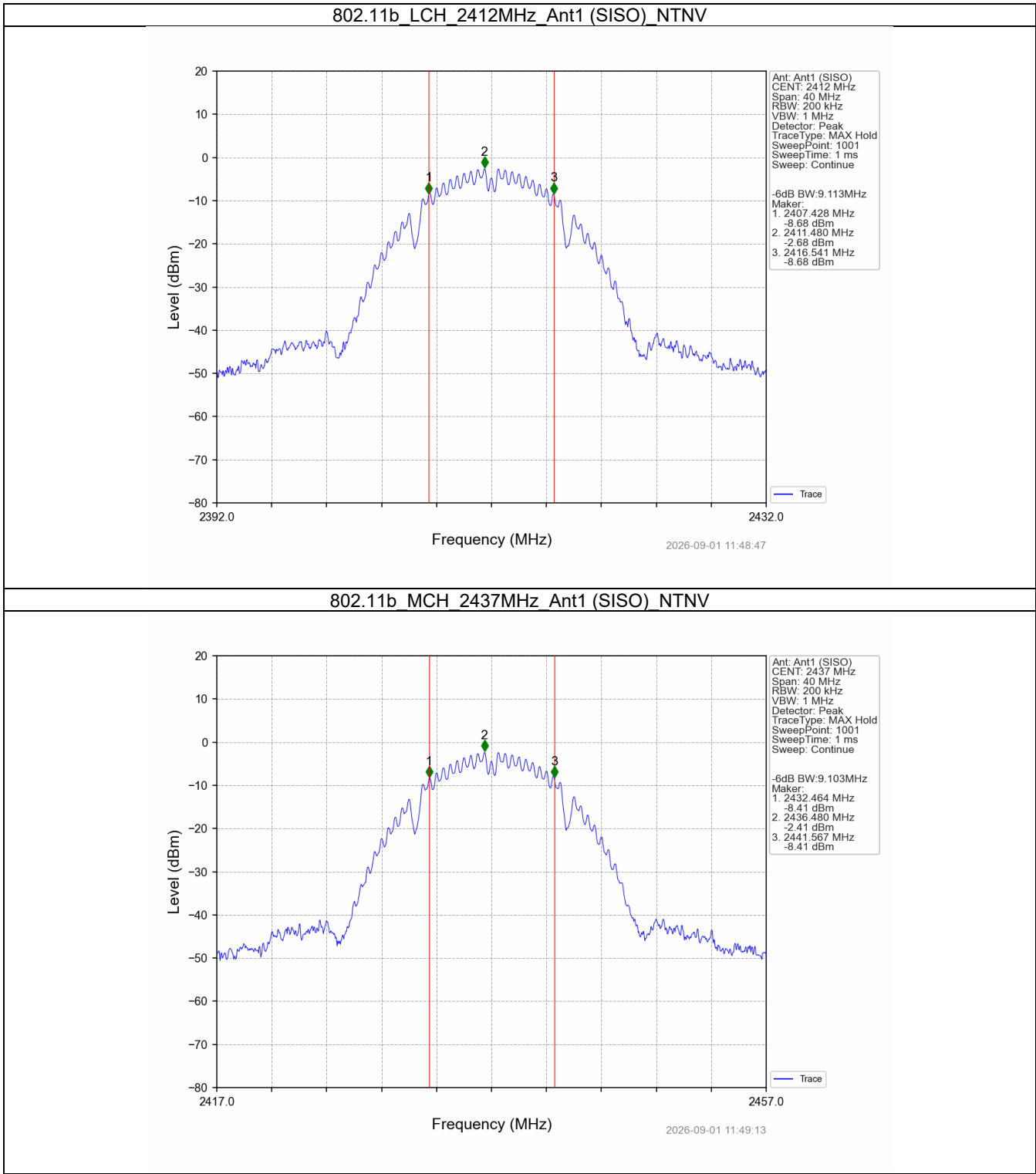
# 802.11n(HT20)\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



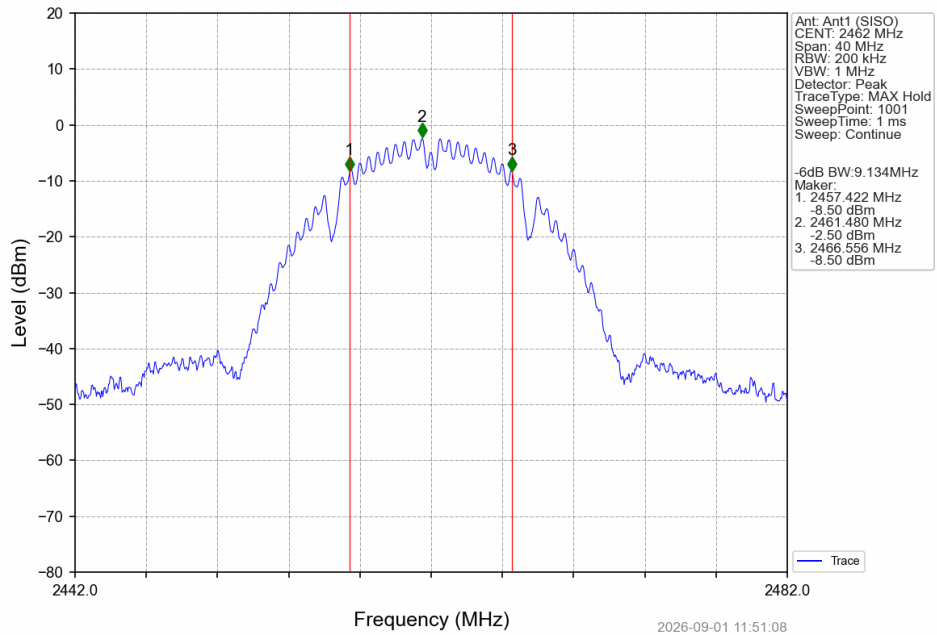
802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



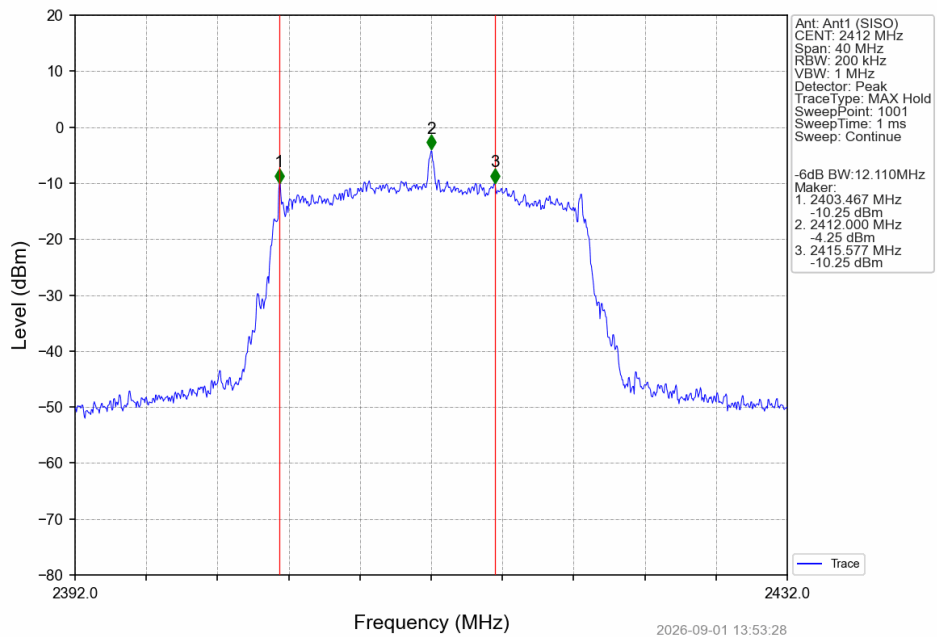
2.2.2 6dB BW



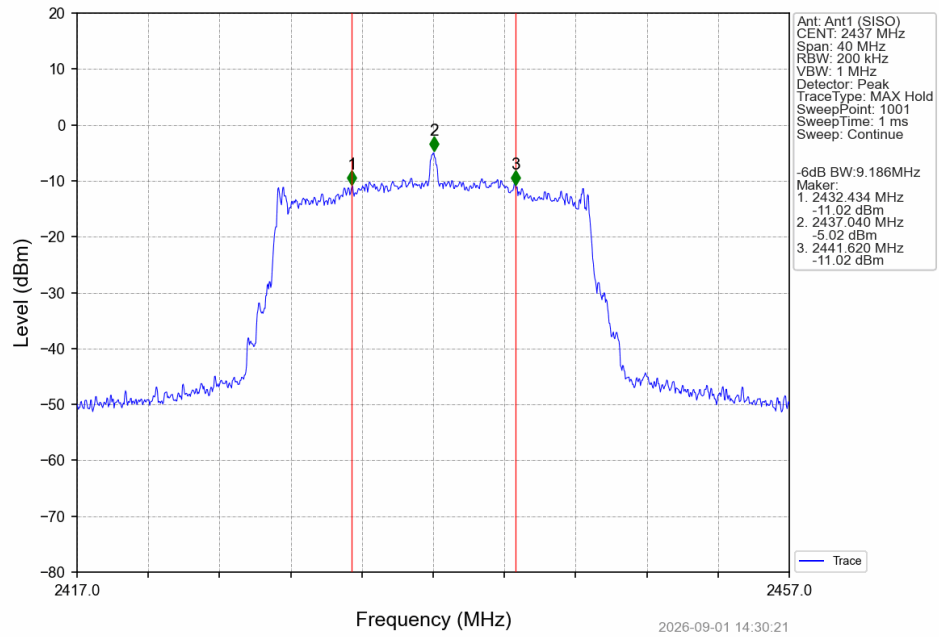
# 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



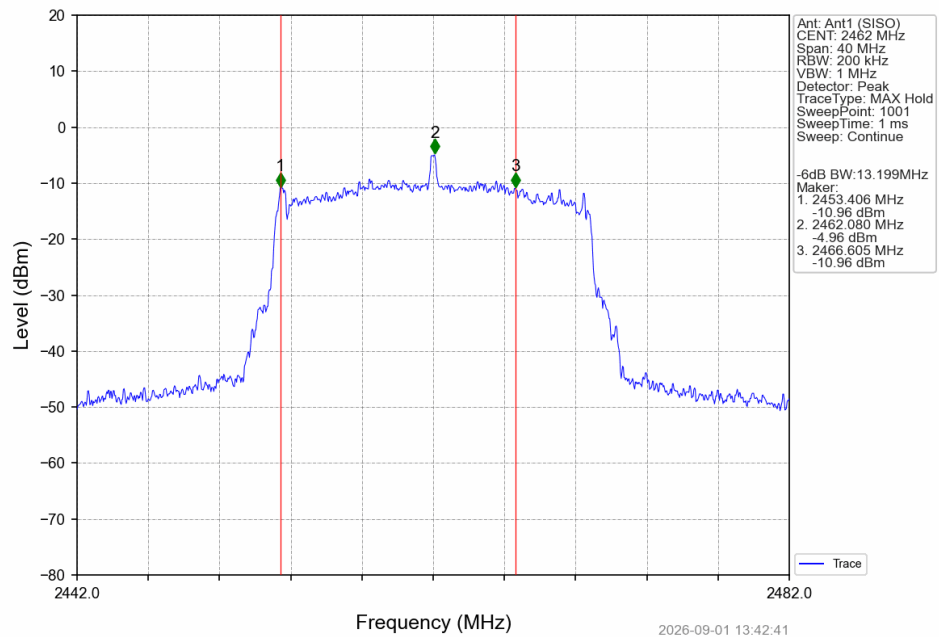
# 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



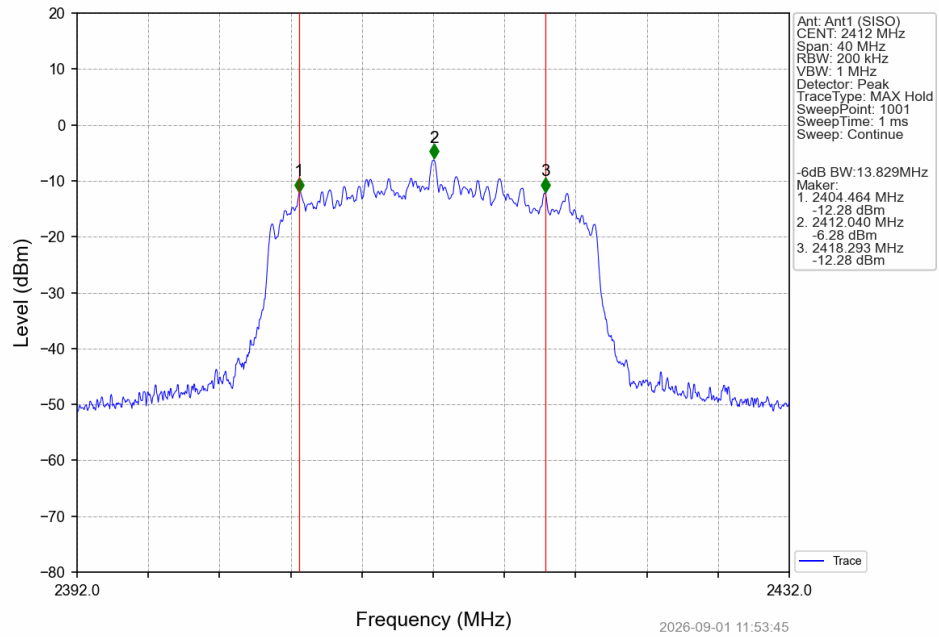
### 802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



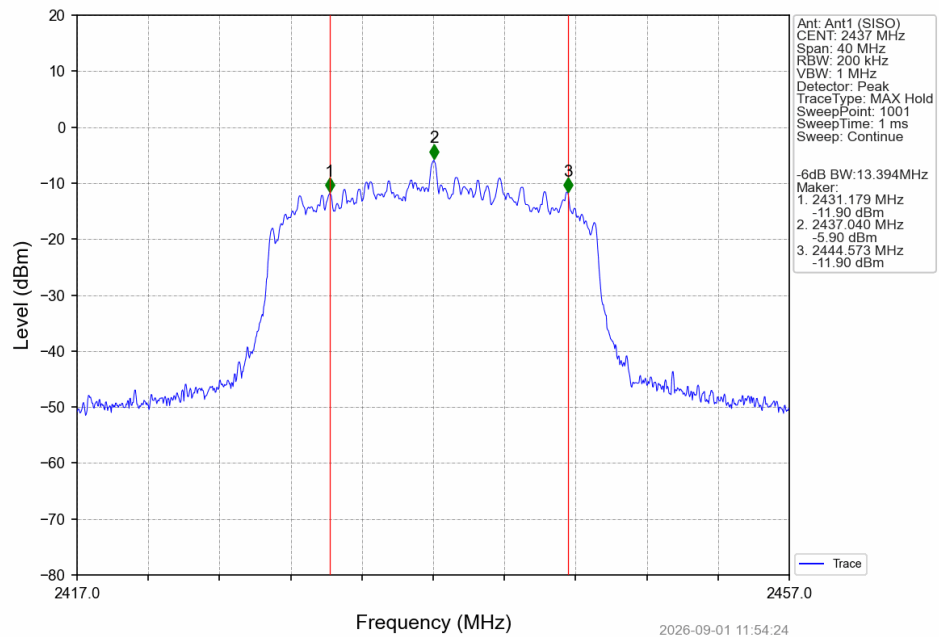
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



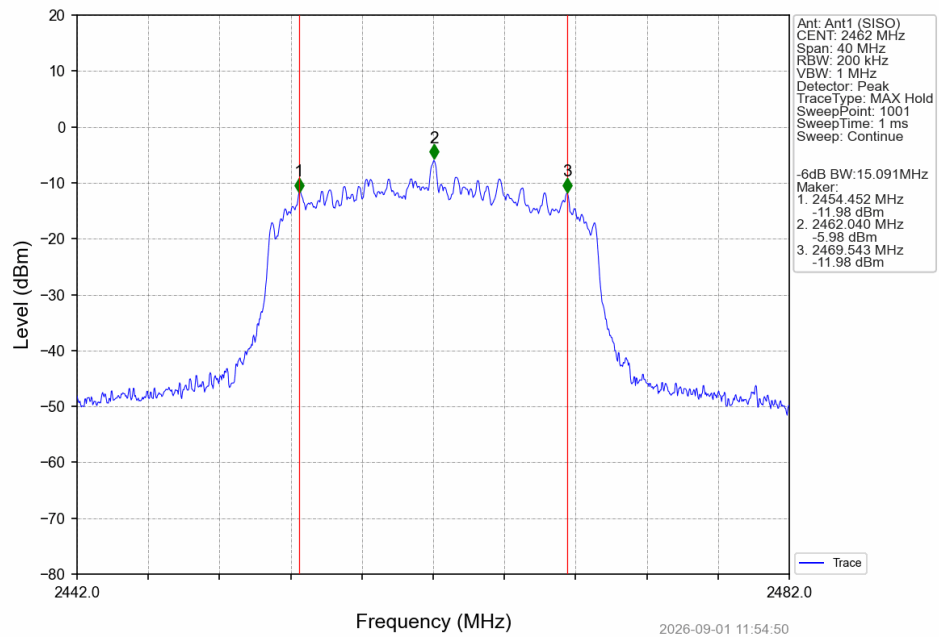
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



# 802.11n(HT20)\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



### 3. Maximum Conducted Output Power

#### 3.1 Test Result

##### 3.1.1 Power

| Mode           | TX Type | Frequency (MHz) | Maximum Peak Conducted Output Power (dBm) |       | Verdict |
|----------------|---------|-----------------|-------------------------------------------|-------|---------|
|                |         |                 | ANT1                                      | Limit |         |
| 802.11b        | SISO    | 2412            | 8.41                                      | <=30  | Pass    |
|                |         | 2437            | 8.60                                      | <=30  | Pass    |
|                |         | 2462            | 8.50                                      | <=30  | Pass    |
| 802.11g        | SISO    | 2412            | 7.60                                      | <=30  | Pass    |
|                |         | 2437            | 7.11                                      | <=30  | Pass    |
|                |         | 2462            | 8.15                                      | <=30  | Pass    |
| 802.11n (HT20) | SISO    | 2412            | 6.96                                      | <=30  | Pass    |
|                |         | 2437            | 7.19                                      | <=30  | Pass    |
|                |         | 2462            | 7.54                                      | <=30  | Pass    |

## 4. Maximum Power Spectral Density

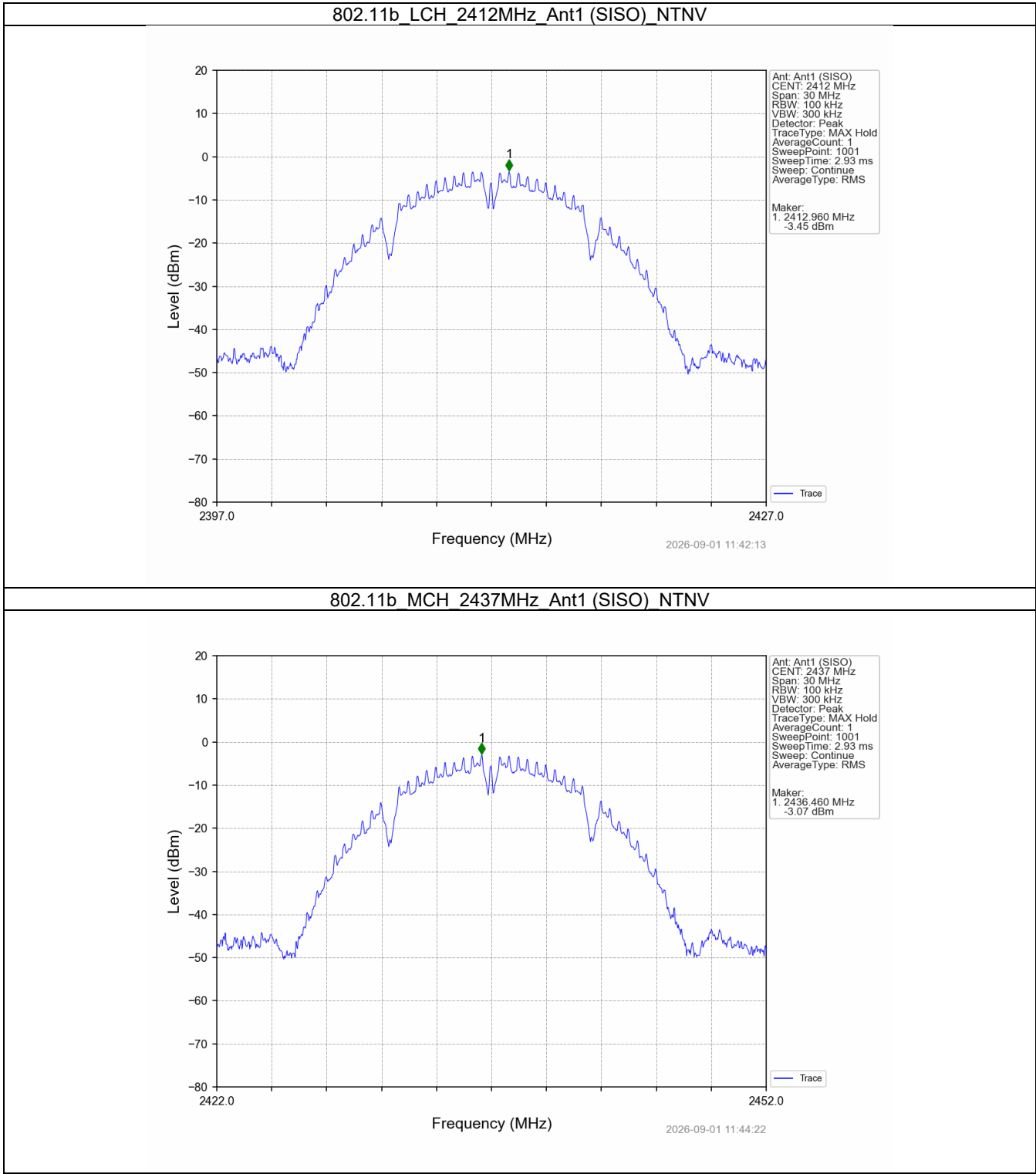
### 4.1 Test Result

#### 4.1.1 PSD

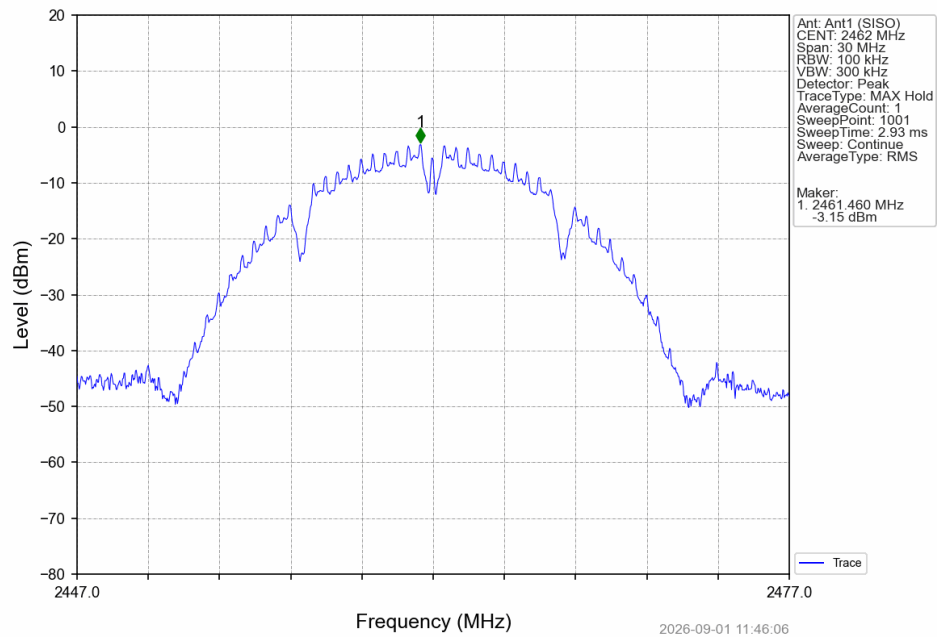
| Mode           | TX Type | Frequency (MHz) | Maximum PSD (dBm) |                 | Verdict |
|----------------|---------|-----------------|-------------------|-----------------|---------|
|                |         |                 | ANT1              | Limit(dBm/3kHz) |         |
| 802.11b        | SISO    | 2412            | -3.45dBm/100kHz   | <=8             | Pass    |
|                |         | 2437            | -3.07dBm/100kHz   | <=8             | Pass    |
|                |         | 2462            | -3.15dBm/100kHz   | <=8             | Pass    |
| 802.11g        | SISO    | 2412            | -5.02dBm/100kHz   | <=8             | Pass    |
|                |         | 2437            | -5.38dBm/100kHz   | <=8             | Pass    |
|                |         | 2462            | -4.65dBm/100kHz   | <=8             | Pass    |
| 802.11n (HT20) | SISO    | 2412            | -7.63dBm/100kHz   | <=8             | Pass    |
|                |         | 2437            | -7.75dBm/100kHz   | <=8             | Pass    |
|                |         | 2462            | -7.43dBm/100kHz   | <=8             | Pass    |

4.2 Test Graph

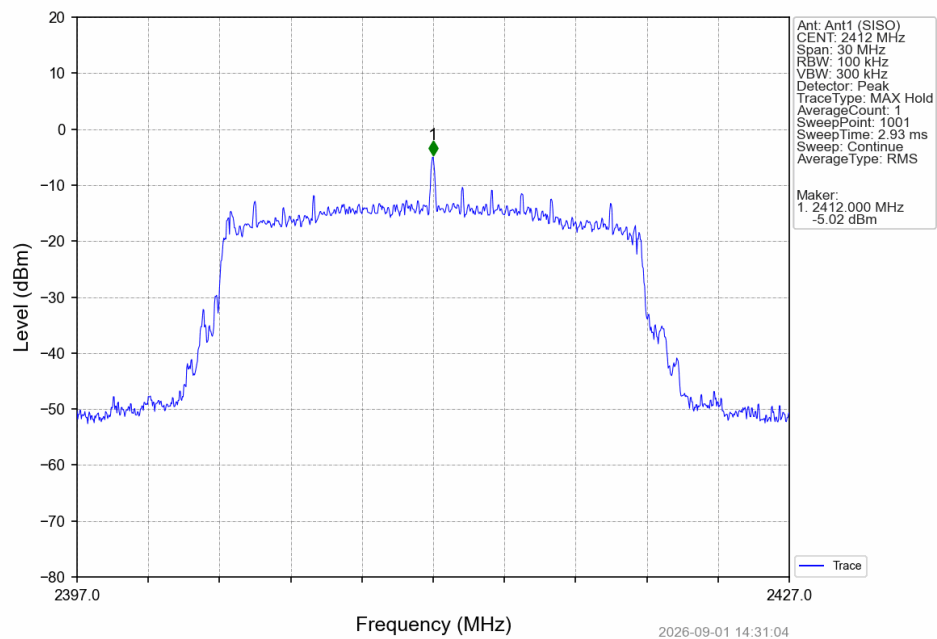
4.2.1 PSD



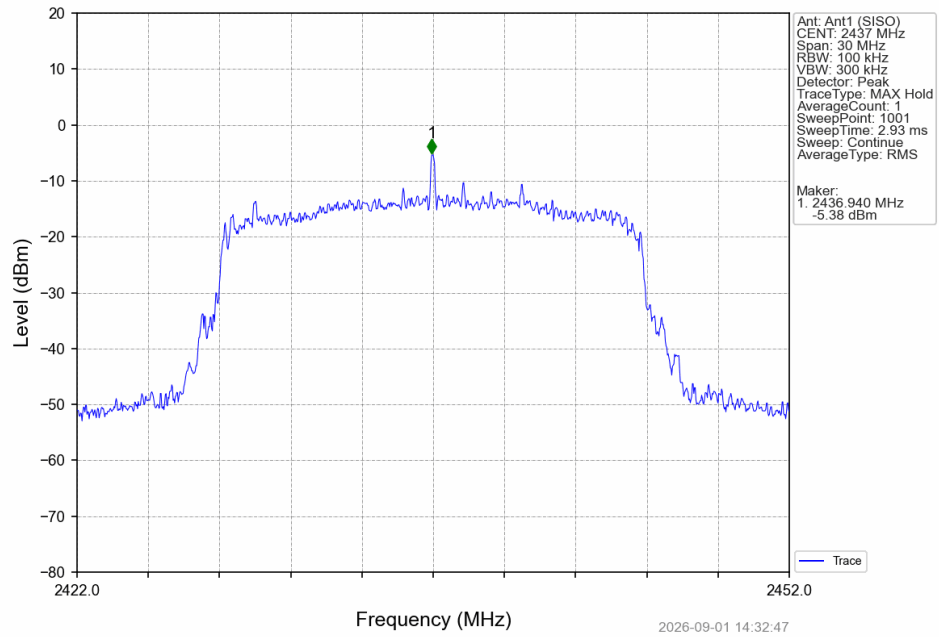
### 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



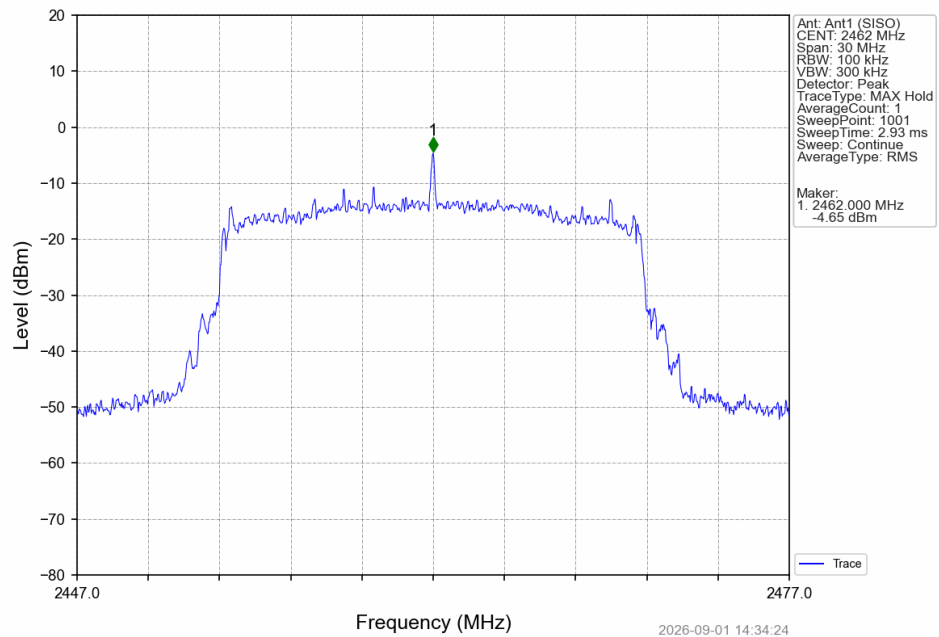
### 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



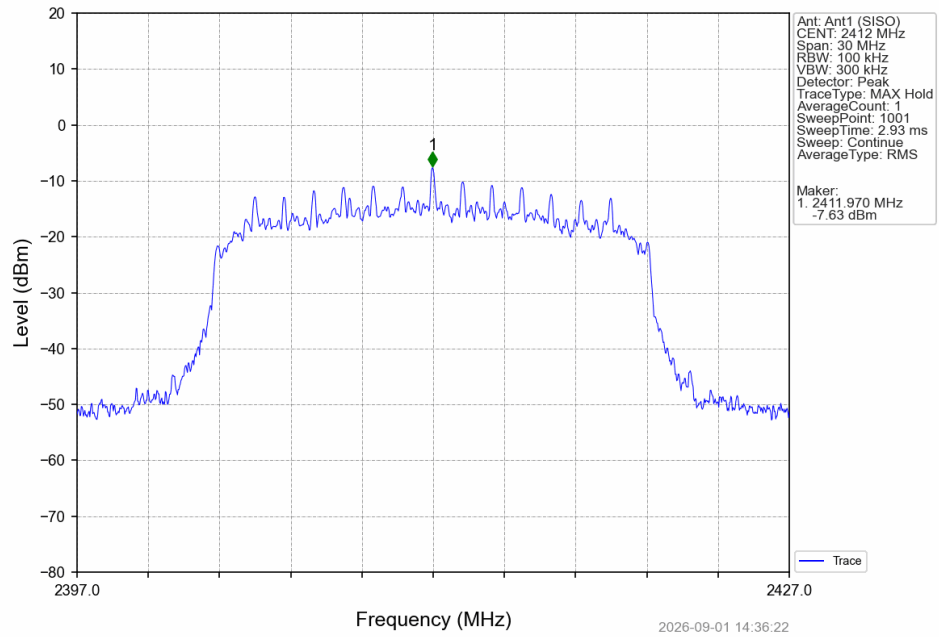
### 802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



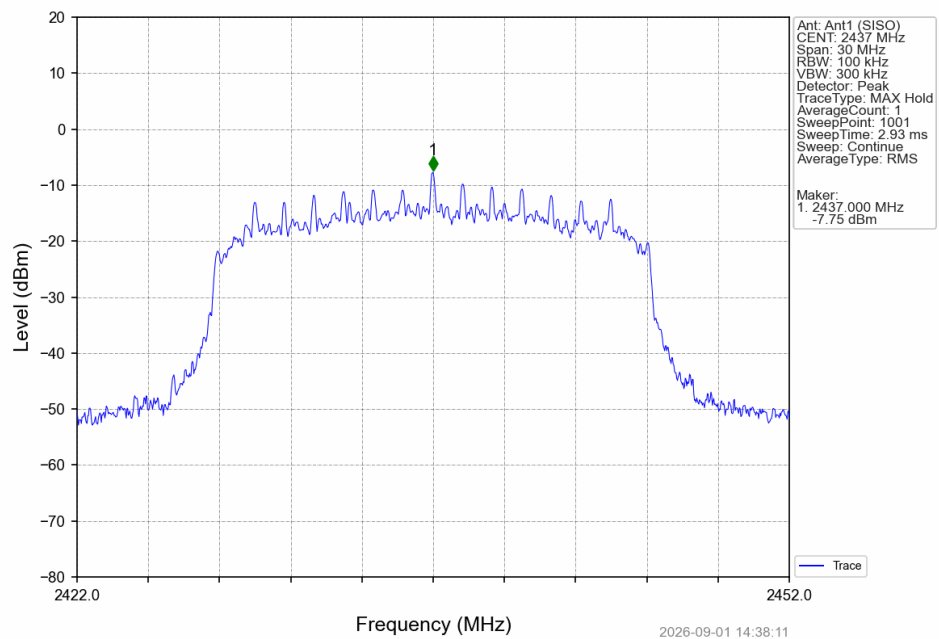
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



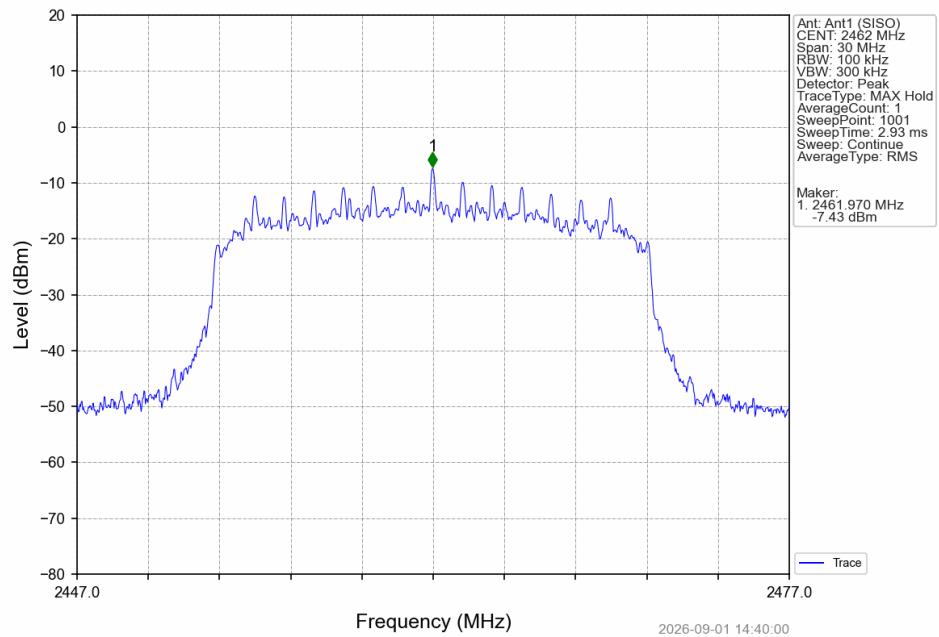
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



# 802.11n(HT20)\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



## 5. Unwanted Emissions In Non-restricted Frequency Bands

### 5.1 Test Result

#### 5.1.1 Ref

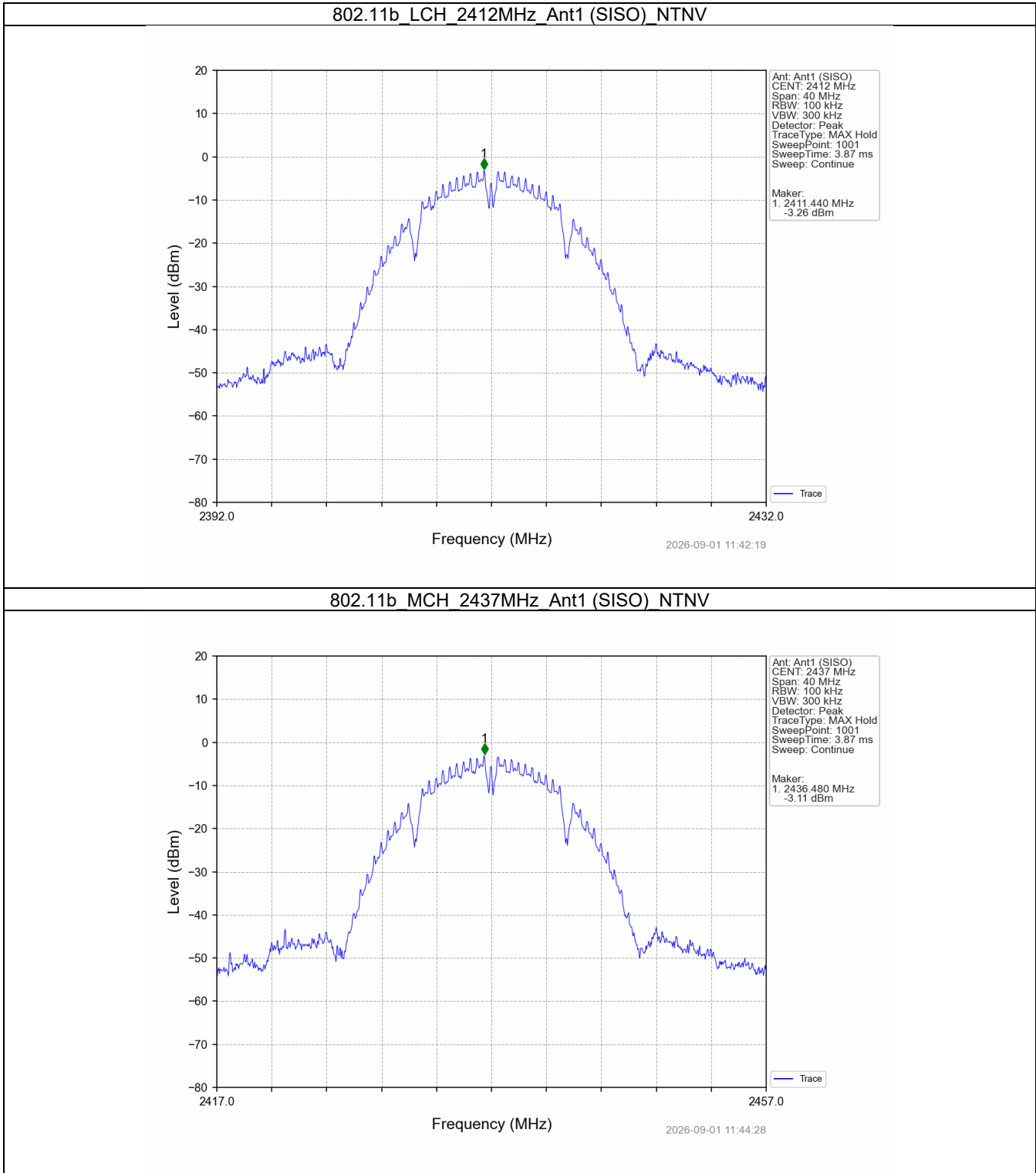
| Mode           | TX Type | Frequency (MHz) | ANT | Level of Reference (dBm) |
|----------------|---------|-----------------|-----|--------------------------|
| 802.11b        | SISO    | 2412            | 1   | -3.26                    |
|                |         | 2437            | 1   | -3.11                    |
|                |         | 2462            | 1   | -3.38                    |
| 802.11g        | SISO    | 2412            | 1   | -5.16                    |
|                |         | 2437            | 1   | -4.36                    |
|                |         | 2462            | 1   | -5.09                    |
| 802.11n (HT20) | SISO    | 2412            | 1   | -7.48                    |
|                |         | 2437            | 1   | -7.11                    |
|                |         | 2462            | 1   | -7.16                    |

#### 5.1.2 CSE

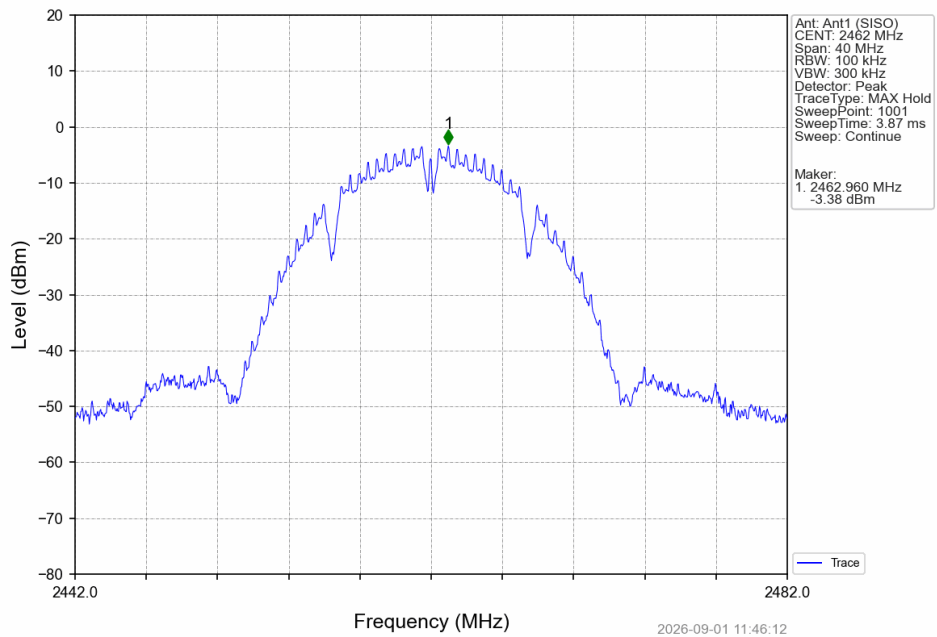
| Mode           | TX Type | Frequency (MHz) | ANT | Level of Reference (dBm) | Limit (dBm) | Verdict |
|----------------|---------|-----------------|-----|--------------------------|-------------|---------|
| 802.11b        | SISO    | 2412            | 1   | -3.26                    | -23.26      | Pass    |
|                |         | 2437            | 1   | -3.11                    | -23.11      | Pass    |
|                |         | 2462            | 1   | -3.38                    | -23.38      | Pass    |
| 802.11g        | SISO    | 2412            | 1   | -5.16                    | -25.16      | Pass    |
|                |         | 2437            | 1   | -4.36                    | -24.36      | Pass    |
|                |         | 2462            | 1   | -5.09                    | -25.09      | Pass    |
| 802.11n (HT20) | SISO    | 2412            | 1   | -7.48                    | -27.48      | Pass    |
|                |         | 2437            | 1   | -7.11                    | -27.11      | Pass    |
|                |         | 2462            | 1   | -7.16                    | -27.16      | Pass    |

5.2 Test Graph

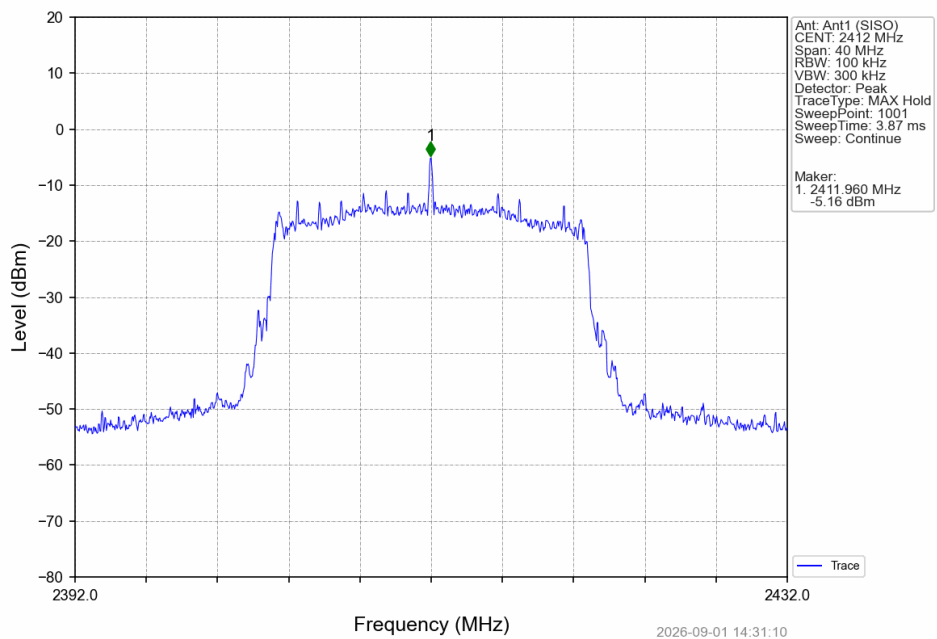
5.2.1 Ref



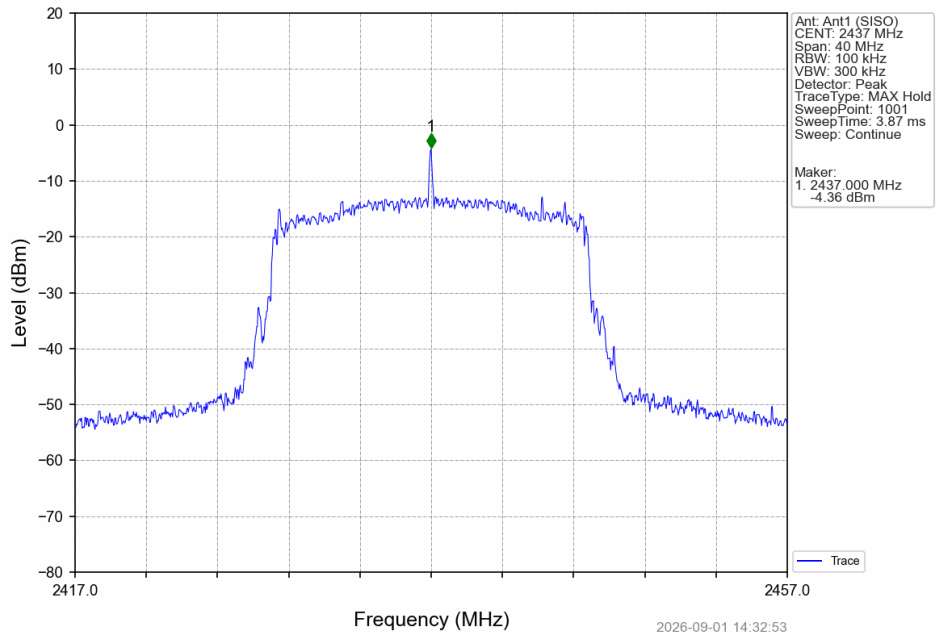
### 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



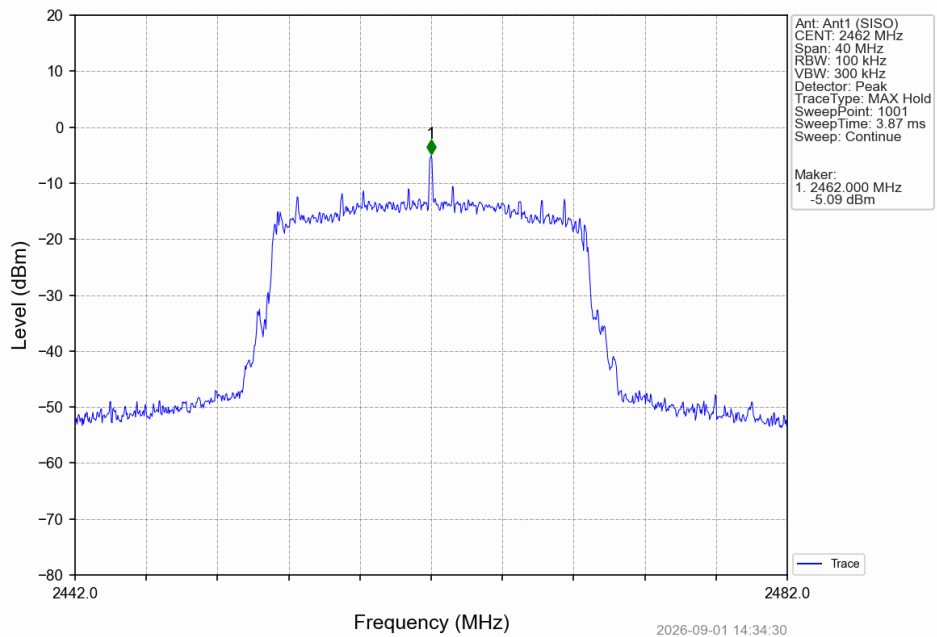
### 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



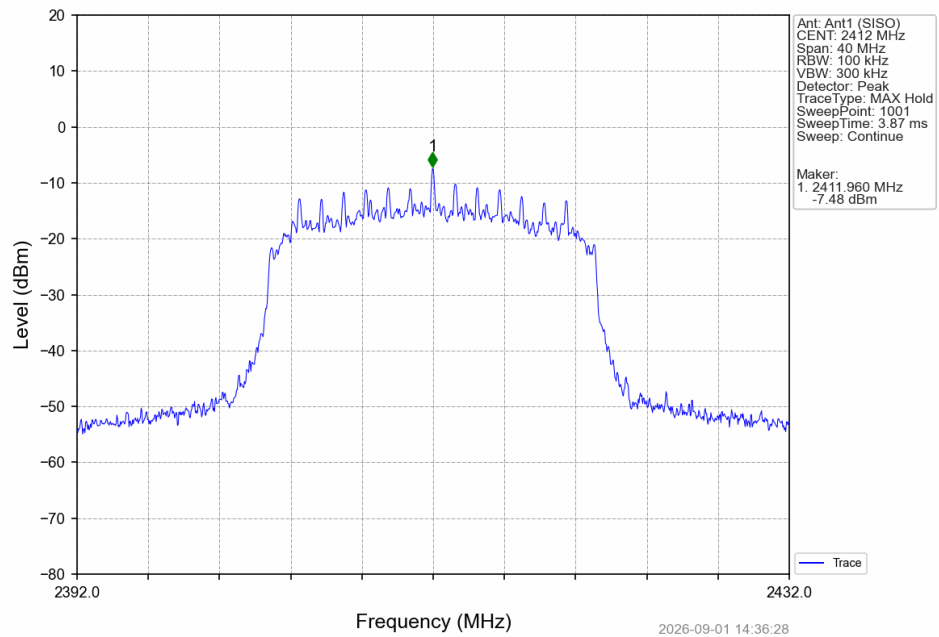
### 802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



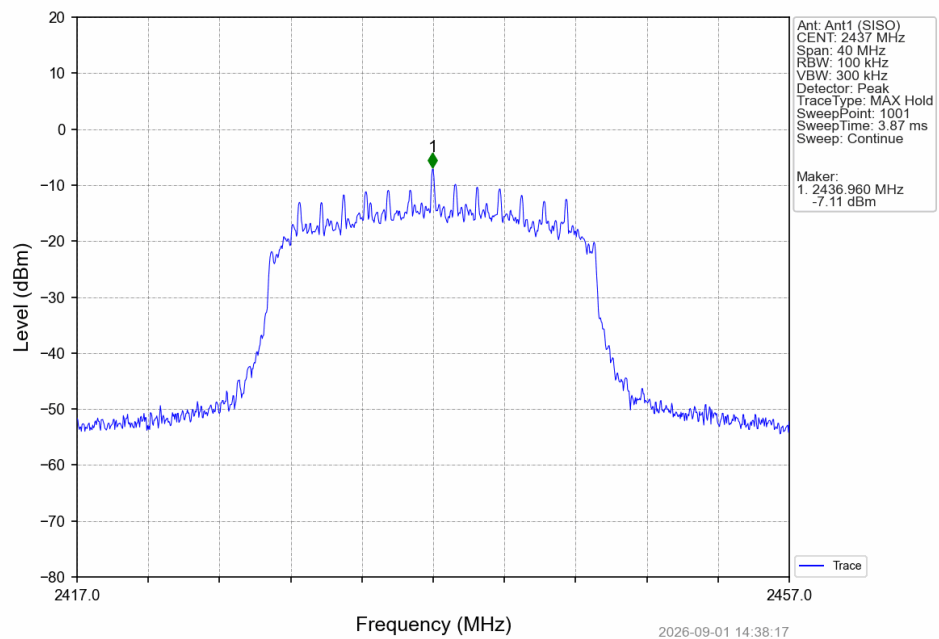
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



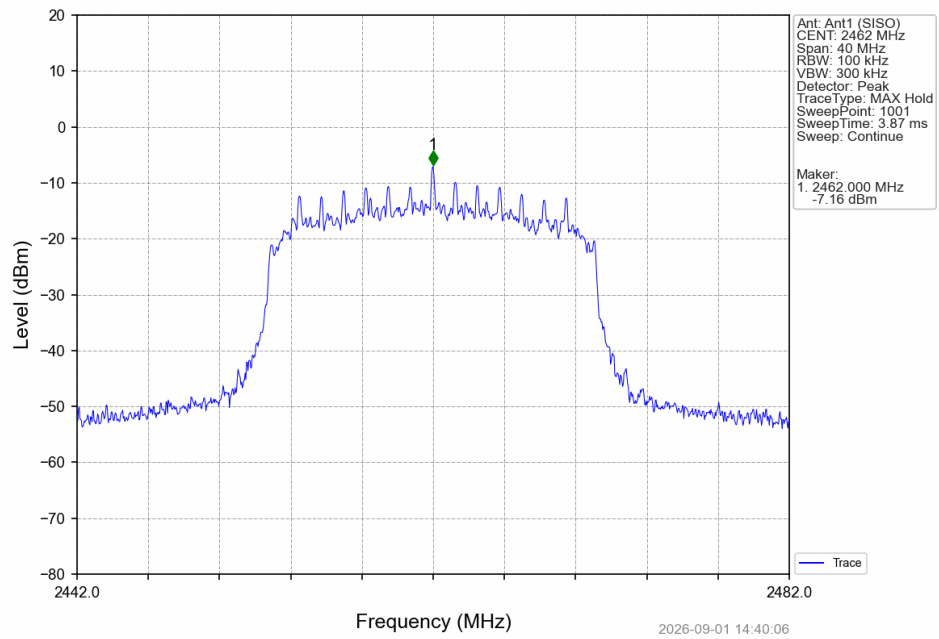
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



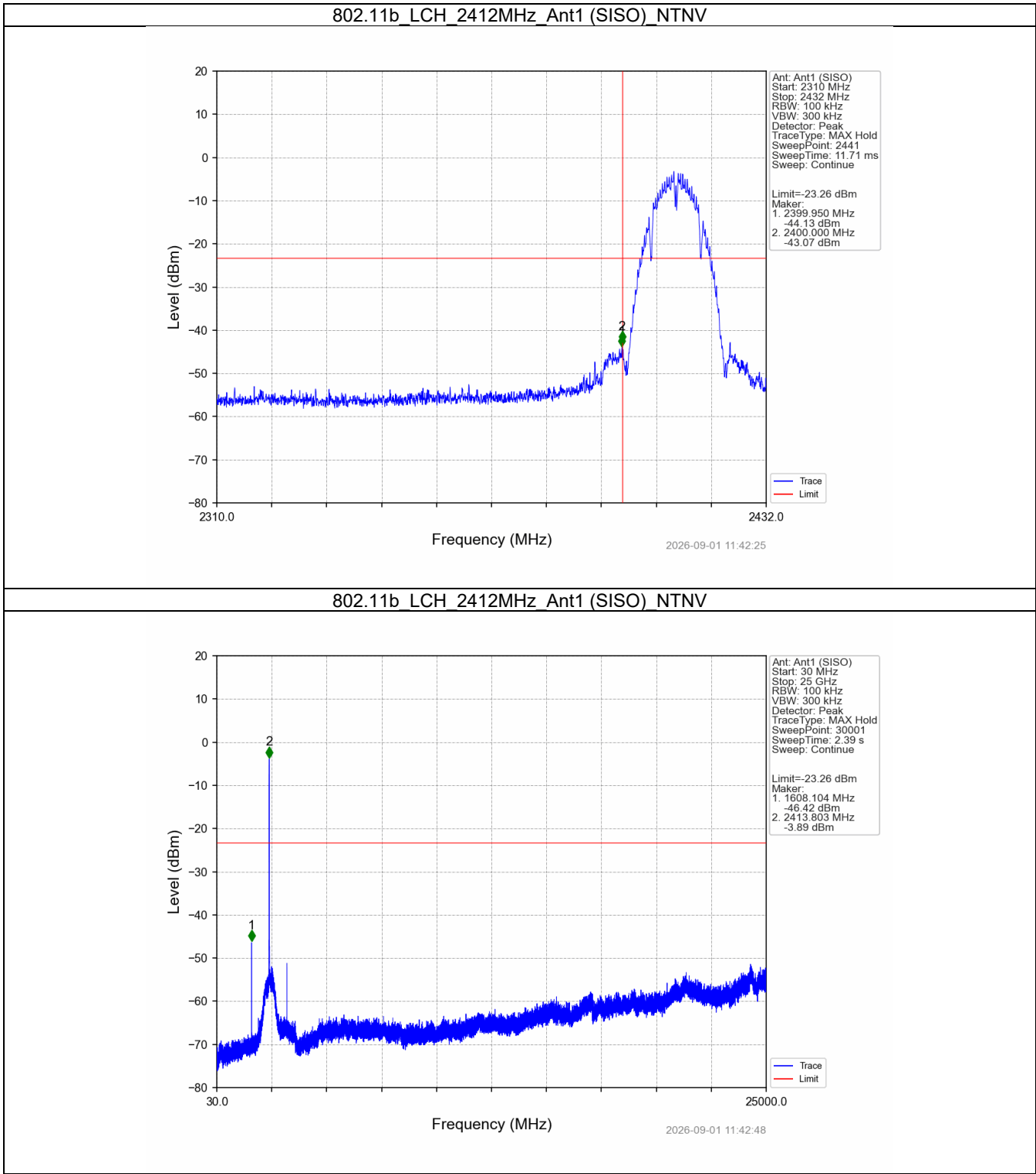
# 802.11n(HT20)\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



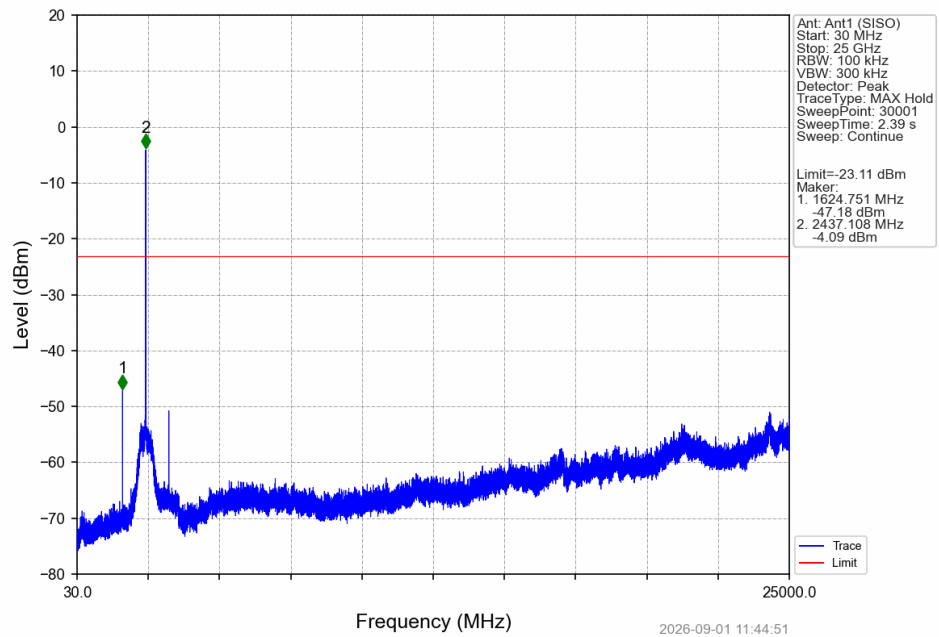
802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



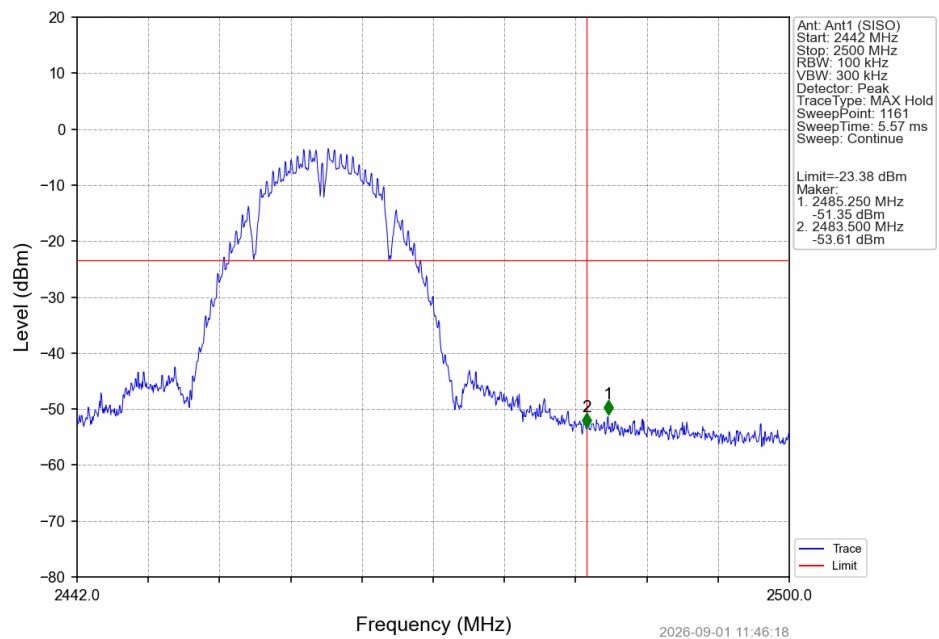
5.2.2 CSE



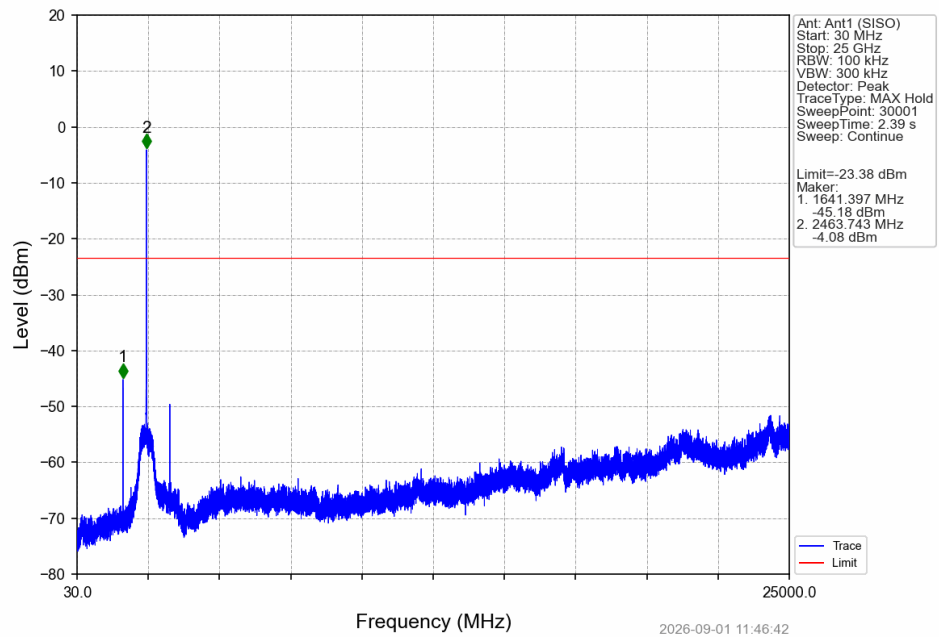
### 802.11b\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



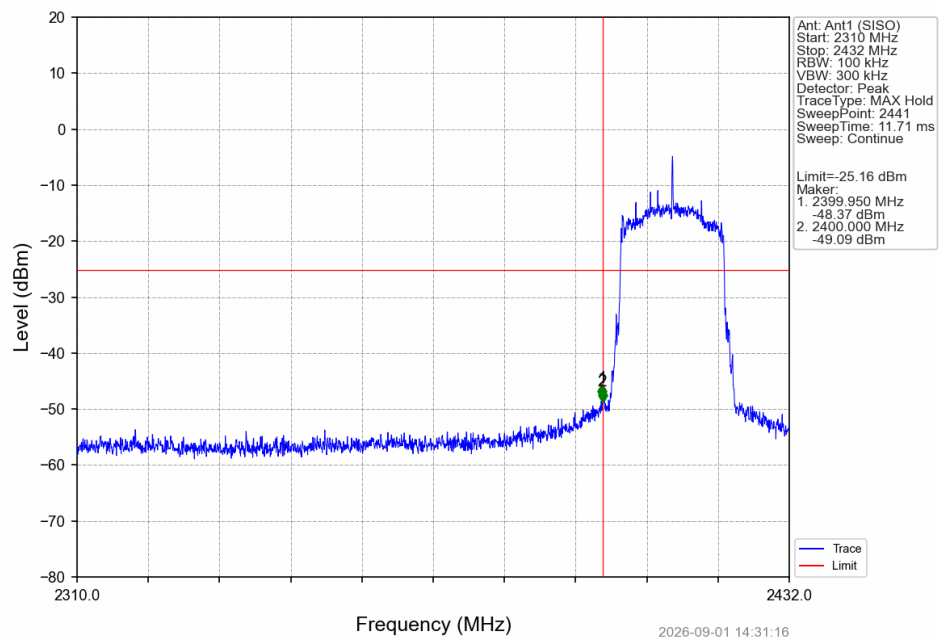
### 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



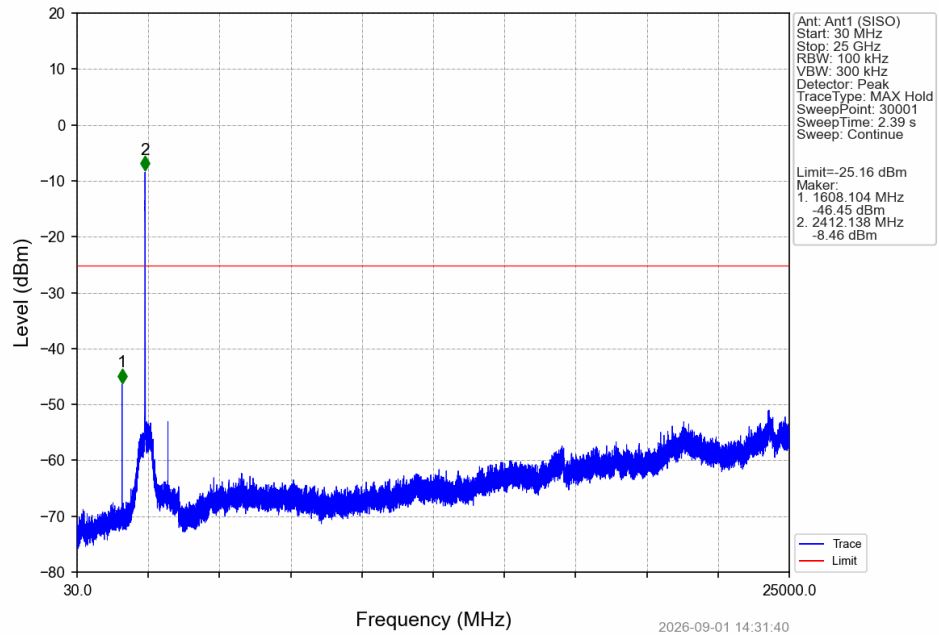
### 802.11b\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



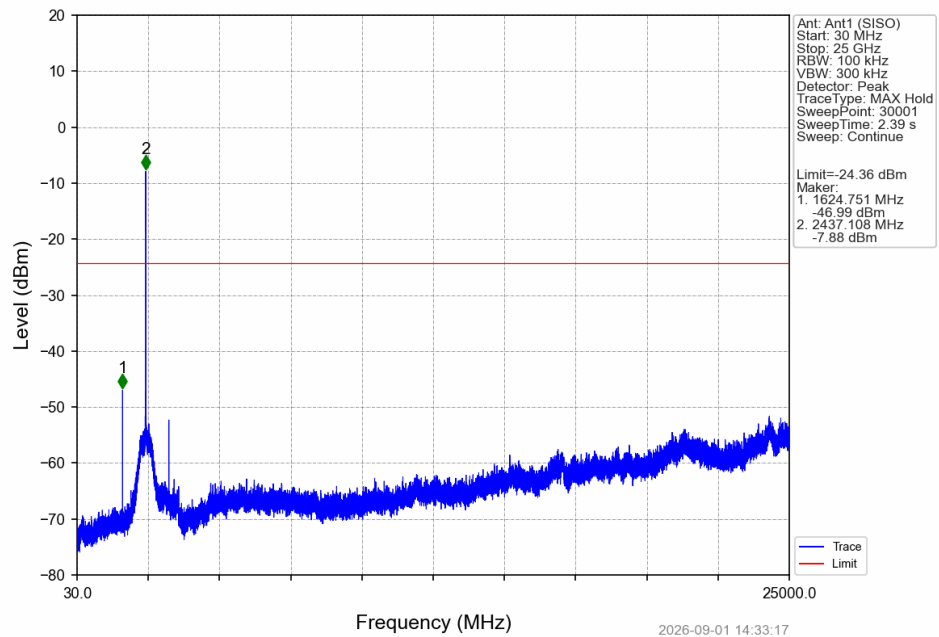
### 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



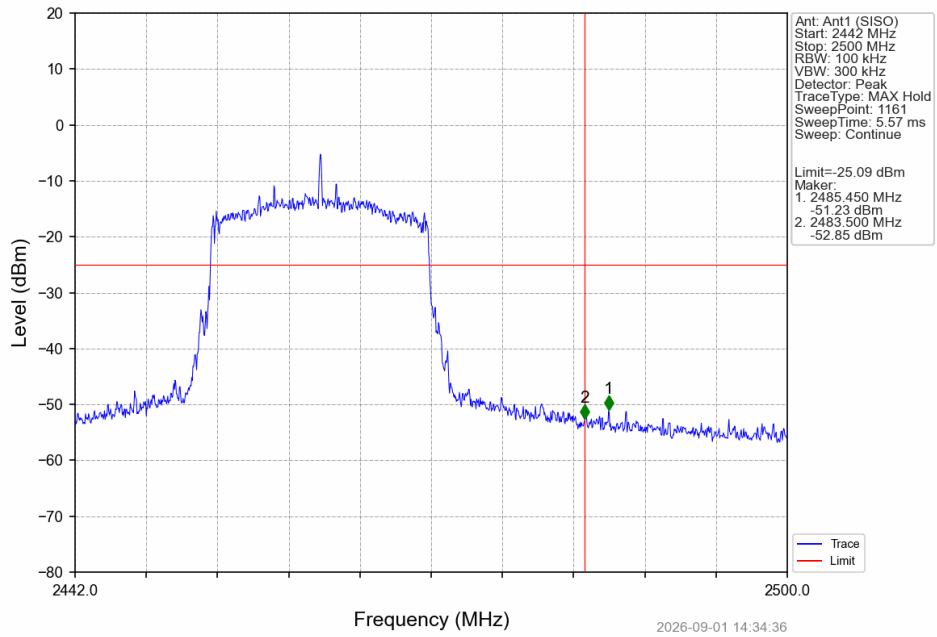
### 802.11g\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



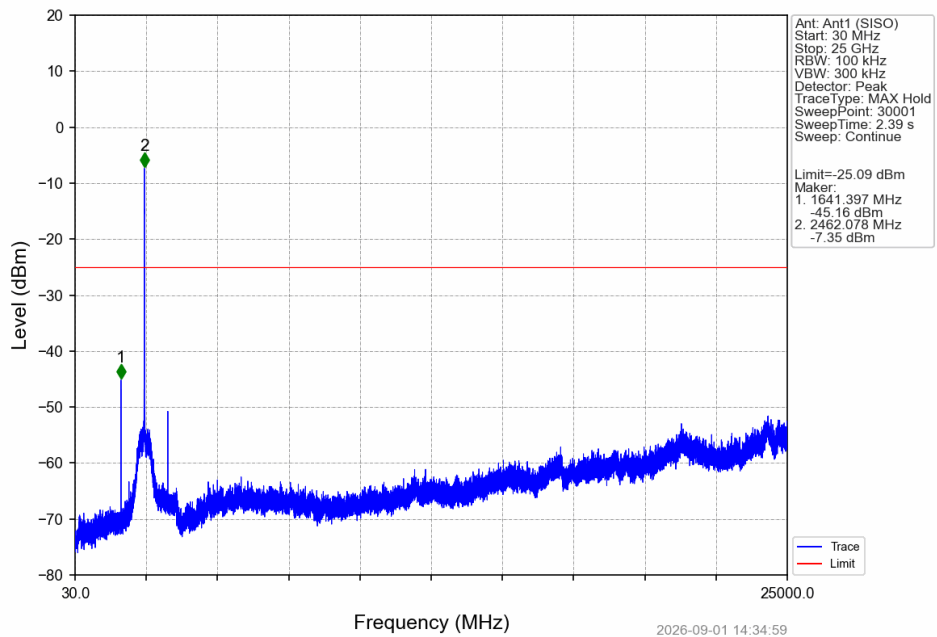
### 802.11g\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



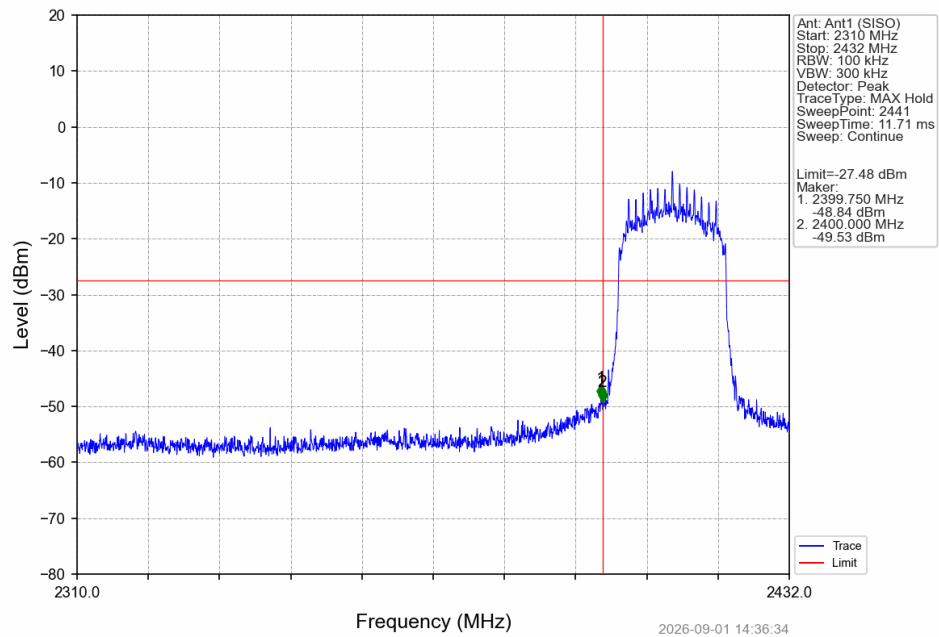
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



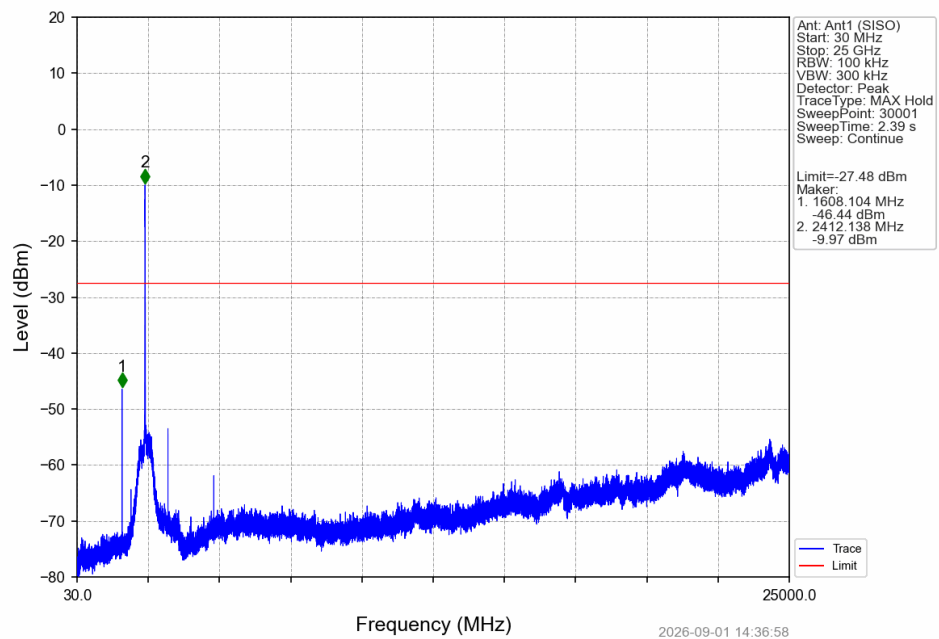
### 802.11g\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



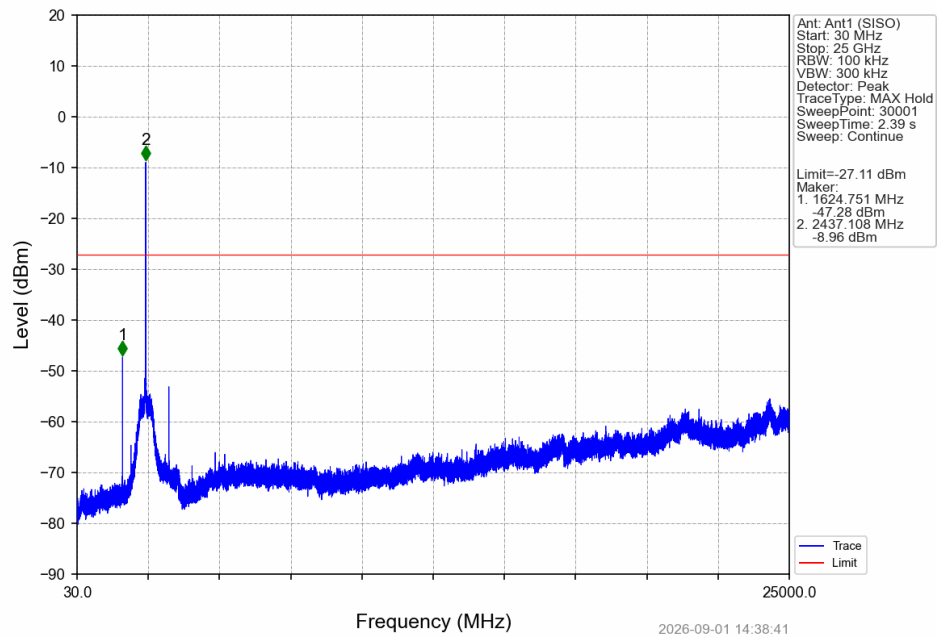
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



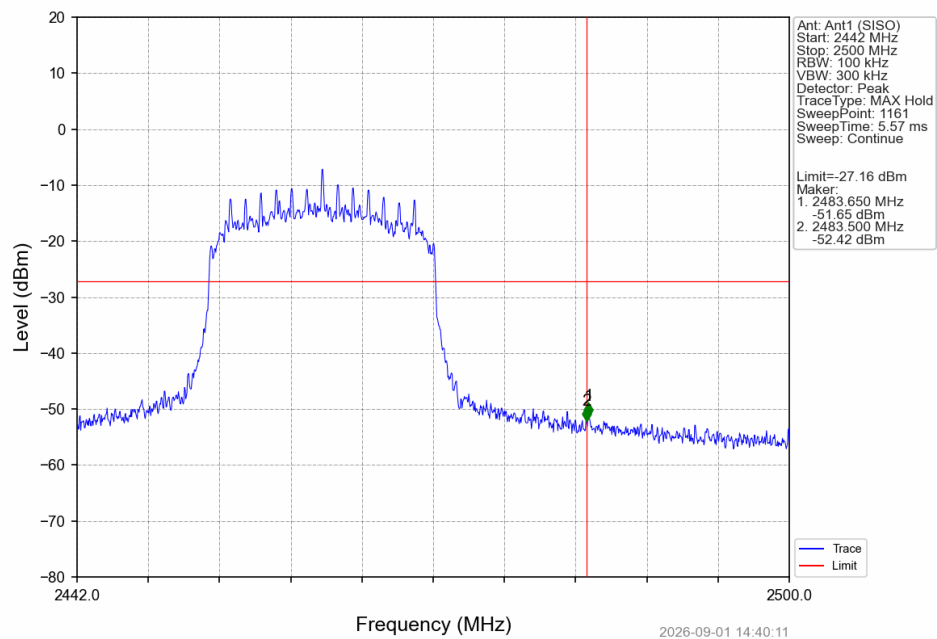
# 802.11n(HT20)\_LCH\_2412MHz\_Ant1 (SISO)\_NTNV



# 802.11n(HT20)\_MCH\_2437MHz\_Ant1 (SISO)\_NTNV



# 802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV



# 802.11n(HT20)\_HCH\_2462MHz\_Ant1 (SISO)\_NTNV

